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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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VOL. CLXXXVI. No. 3439.] WEDNESDAY, APRIL 17, 1929 [81ST YEAR.

Editorial Notes.

The Urge from Within.

In our columns a few months ago, we suggested that the growing strength of our industry could be traced in large measure to the fact that the urge for development had come from within the industry, and had not needed "the pressure of successive Governments and the weight of public opinion to dislodge it from the pedestal of antiquated dogma." With this idea, Mr. J. W. Napier, of Alloa, is in agreement; indeed, he suggested in his Presidential Address before the North British Association of Gas Managers last week that only by internal organization and friendly co-operation between one gas engineer and another can the gas industry hope to accelerate its progress and reap the full reward of amalgamation when it is proved beyond doubt that this will result in economy and more efficient service. In this regard judgment and vision have to be nicely combined, for our industry differs greatly from that of electricity. "Amalgamation" should be the aim only when conditions are favourable, for gas-making in many respects does not follow the lines of generation of electric current. There is no question that large electricity stations imply saving in fuel costs—this is shown clearly by Mr. Napier in his figures for the coal consumption of stations generating 1 million units and (say) 75 million units per annum, 7·05 lbs. and 2·10 lbs. per unit respectively. On the other hand, gas production costs are not necessarily in favour of large works; with a modern carbonizing plant in a small gas-works, it may well be that the consumption of coal for an equivalent of gas is as efficient as in the case of a large undertaking.

There is, however, another aspect to the question of amalgamation and joint working, apart entirely from a cheaper therm delivered into the holder; and that is the ability to further the sales of gas. Contemplation of the potentialities of gaseous fuel in the field of industrial operation can give rise only to one feeling—optimism. We are as yet merely at the edge of this field, at the very commencement of its development; but it has to be borne in mind that the industrial load cannot be gained in proper proportion unless specialists are employed to exploit it. The small undertaking cannot afford such trained engineers; and the solution to this difficulty lies in co-operative working. To achieve this end, those responsible for the policy and administration of gas concerns must be animated by a spirit of comradeship towards the industry as a whole. The parochial idea will simply have to disappear, however difficult it may be for those who are working in financially successful compartments.

We arrive, then, once again at the idea first expressed in this note—that the urge must come from within our industry. Unless combined operation brings about economies, it obviously fails in its purpose; and the burdens of unnecessary expenditure are inevitably distributed to the consumers of gas. In such cases, errors of judgment can be ascribed to what Mr. Napier terms the "foolish encouragement of extravagant expenditure on public utilities," by those whose aims are good, but whose knowledge of the technical and commercial working of gas concerns leaves much to be desired. Here Mr. Napier raises a very important point: In view of the constantly changing personnel of municipal gas committees, is local government—so largely under the control of the popular choice of an electorate of people—the best suited for the conduct of the future policy of the gas industry? In regard to gas affairs in Scotland, where 86 p.ct. of the gas output is owned by local authorities, Mr. Napier leaves no doubt as to his opinion on the matter. "Government by town council or county council," he says, "should not be allowed to dominate as it does so largely at present the gas supply of Scotland;" and he gives the impression that such domination acts as inertia to the development of the gas industry from within. Private enterprise and private ownership, he points out, are considered in America—where only 1·5 p.ct. of the total gas output is under municipal control—as being essential to successful industrial development. It is not our intention to delve deeply into this fascinating, though perilous, question; we have in mind municipally-owned gas undertakings in England which can be counted among the most efficient and progressive, from all points of view, in the world. But we do wish to emphasize that the gas industry must to-day be regarded as a coherent whole rather than as an aggregation of scattered and unconnected undertakings. Anything which hampers this vision—be it the result of the comfortable tendency to let well alone, and pocket the dividends accruing from a seemingly sound concern; or, with local government, the influence of political thought—is definitely wrong. Every effort must be made, by the vehemence of righteousness or of ridicule, to stamp it out.

Mr. Napier emphasizes that co-ordinated supply does not mean that the identity of the individual concern need be lost. Indeed, it is most desirable that the undertaking which acts as distributor of gas manufactured by another concern should, in its relations to the consumers in the area, and in its general policy, carry on as before. Understanding of the area, and personal contact with the people, possessed by the distributing undertaking are of the utmost value in the promotion of sales, and the maintenance of goodwill. His address relates to conditions of gas supply in Scotland, which admittedly differ widely in many respects from those in England; but the substance of his remarks is generally applicable to both countries. "We are first and last," he observes, "a great national commercial business; and before it is too late, and before the Government has been forced to grip the situation—and public utility service is attractive to Governments—we do want to pool our individual resources, and unify the gas supply where such is possible." There is, he maintains, need for investigation and collaboration by individual undertakings forming a likely group; and the fear of compulsory acquisition and reduced value of investment should not exist.

Changed Conditions.

The rapid growth of the hire-purchase system has been one of the outstanding financial features of the past few years, both in this country and in the United States. It has, in fact, revolutionized the business methods of huge industries, just as it has rendered domestic budgeting essential in a large proportion of households. It has affected other conditions as well; but the two mentioned are sufficient for our purpose.

A week or so ago, the "Financial Times" quoted figures relating to one concern which reflected the rapid progress of the instalment plan. It appears from these that the latest returns issued by the United Dominions Trust show that, while for March, 1928, the Company financed merchandize, including motor-cars and machinery, to the value of £384,506, the corresponding figure for March, 1929, was £537,388, representing an increase of almost 40 p.ct. per annum. This is understood to be a record figure in monthly business for a British Corporation financing hire-purchase. We have some recollection of having seen, a short time back, a calculation by an expert that 80 p.ct. of the motor-cars on the roads were being acquired upon the "pay as you ride" system. He may, of course, have been an optimist; but in any case the figure must prove a startling one to old-fashioned people who have been in the habit of paying before they rode. Weighty arguments have been adduced to show that the now popular plan must lead to disaster; equally weighty ones indicate that it possesses overwhelming advantages. The truth lies probably—as is generally the case—somewhere between the two. Many people are enabled to make highly desirable acquisitions which would except upon these terms be out of the question; others become involved in liabilities that might well have been avoided. One feels that a longer interval of time, and a period of great economic depression, must be required to reveal the full effects of the system.

But, for better or for worse, hire-purchase is with us now, and will remain with us; and even those who do not take advantage of the opportunities it offers will be unable to avoid being influenced by it. One of the influences is in the direction of domestic budgeting. Hire-purchase is, in nearly all cases, arranged on the lines of monthly payments; and the householder or the flat-dweller will more and more as time passes be compelled to reckon his outgoings upon a monthly basis. The moral for the gas industry is obvious. It stands confronted, in this connection, with an entirely new set of conditions, which present arguments in favour of a change that could hardly be said to exist even a few years ago.

South Suburban Company Adopt Monthly Accounts.

Since the above article was written, we have been given to understand that, consequent upon the success attending the adoption by the South Metropolitan Gas Company of the monthly system of account rendering and collecting, the Board of the South Suburban Company decided at the last meeting that the system should be applied over the whole of their area as soon as the necessary arrangements can be made.

A Threat to London.

Rightly the public conscience has been aroused by the proposed erection of a super-power station practically in the heart of London. The site of this enormous plant, which daily will consume about 2000 tons of coal, is at Battersea; and contracts to the value of one-and-a-half millions sterling for the civil engineering and new plant on the station have already been let. Hence it may be assumed that the authorities concerned with its erection will adopt the *non possumus* attitude when faced with such arguments as they are at present—arguments technical and non-technical, voiced by well-known scientists and public men who have the welfare of the community at heart.

The Battersea site is so situated that the prevailing winds will carry all the fumes evolved from the chimneys of the generating plant along a line over the Tate Gallery, Lambeth Palace, St. James's Park, Westminster Abbey, the Houses of Parliament, St. Thomas's Hospital, Whitehall, and the National Gallery. This is by no means a pleasant prospect. It is suggested, of course, that the equipment will be so efficient that practically no smoke will be emitted into the atmosphere. How far this suggestion will appeal to those who have dwelt under the shadow of Lots Road Power Station in Chelsea, we do not know; for we have before us statements to the effect that daily the station deluges the neighbourhood with grit, that on gusty days there are blinding storms of hard soot, and that smoke deposit enters every room in every house. The complaints of those who live in these houses are pathetic and continuous, but unavailing. In a letter to "The Times" last week, a correspondent who dwells in Chelsea stated that at six o'clock in the morning on a fine day one can see a cloud of soot which trails from the chimneys at Lots Road to Westminster. "Often it has the remarkable and sinister effect of a heavy black curtain festooned between Lots Road and Westminster Abbey, and one can actually see the black rain of smuts and ash which form the curtain." In this regard, attention may be called to the fact that the Battersea Station will be four times as large as that at Lots Road.

Visible smoke, however, is by no means the major vice of the proposed plant. The real danger lies in the emission of sulphurous fumes. Modern and efficient methods of firing have gone a great way towards eliminating the visible smoke nuisance; otherwise there would have been no Battersea proposal—night would have prevailed in the area! But these very methods assist in the production of oxides of sulphur. The waste gases from a ton of coal generally contain between 40 and 50 lbs. of sulphur; and thus every day the Battersea Station would pour into the atmosphere about 120 tons of sulphuric acid—or 44,000 tons a year. Moreover, in modern plants the waste gases leave the station through comparatively low chimney stacks of large diameter, at so low a temperature and at such a low velocity that they eddy round the tops of the chimneys and flood the surrounding district. These fumes, together with the grit, damage vegetation. In this respect one has only to quote the case of Farnworth *v.* Manchester Corporation, recently decided in the Court of Appeal, when it was admitted that the Barton Power Station had caused serious damage to crops for a radius of at least one mile. The ruling of Lord Justice Scrutton in this case was detailed in the "Journal" for Dec. 19 last, p. 782. Damage to vegetation, though, is only one of a series of dangers. Sulphurous fumes corrode stonework, ironwork, and other metals, and injuriously affect coloured fabrics and paintings; and it seems a trifle illogical that thousands of pounds every year should be expended in restoring important and historic buildings in the very area where it is proposed to erect this gigantic electricity station.

Among others, such men as Lord Dawson of Penn; Lord Meath, President of the Metropolitan Public Gardens Association; Mr. Walter Tapper, President of the Royal Institute of British Architects; Dr. H. M. des Vœux, Chairman of the Coal Smoke Abatement Society; Dr. J. S. Owens, Superintendent of Observations on Atmospheric Pollution; the Treasurer of St. Thomas's Hospital; and the Mayors of Chelsea and Westminster are asking the Government to institute an immediate and searching inquiry into the proposal from all points of view. They do not suggest that super-power stations do not effect economy. They simply contend that the centre of London is no place for the erection of a public nuisance; and they point out that if the Battersea Station is erected, it is inevitable that injunctions will be sought or claims for damages put forward. The promoters will, therefore, be confronted with the certainty of expensive litigation, and the probability of having to face costly compensation. In other words, what may be gained in reduction of distributing costs will be more than counterbalanced by avoidable expenditure. The electricity consumer is unlikely

to benefit. Even if he does get his current slightly cheaper, he will hardly be happy in the knowledge that as a result the ratepayers, including himself, will be called upon to provide the funds necessary to stop the accelerated decay of national buildings, and that the standard of the general amenities of one of the world's most famous areas is being lowered.

There is another vital point concerning this matter which the gas industry would do well to broadcast: How can the suppliers of electricity claim that electricity is the cleanest of all fuels when, in order to produce it, it is necessary to pollute the atmosphere to an alarming degree? The whole question, of course, must be viewed broadly. Electricity is as essential as gas to domestic comfort and industrial progress; but it is fundamentally wrong for any public utility not to take the utmost precautions to prevent pollution of the atmosphere, particularly in an area where it is bound to cause great discomfort. It appears that in this instance the obvious precaution was not taken.

Progressing Backwards.

A suggestion which has been put forward, that the possibility of the arrival in our time of the windowless office and store is worthy of careful consideration, sets one wondering. Little enough sunshine is to be found in this country under the best conditions; and we have been accustomed, with a perseverance almost pathetic, to expend much energy in searching after this little. But we are old-fashioned. With ideas formed before the rise to power of another light which it is unnecessary to name, we have regarded sunlight as one of God's greatest gifts. The open air is not always within the reach of business people; but the open window has been cherished as "the next best thing."

Can it be that this is doomed? Are we really coming to the era of the windowless office and store? Will the "development of civilization" and the "relentless march of progress" compel us to work in boxes? For that is what it amounts to. We hope not. The visualizing of such a state of affairs invites the mind to wander. If windowless offices and stores, why not windowless houses? Here would be another chance for the "jerry builder." He could save the cost of window frames and glass, and perhaps secure an equally good price from the purchaser; and he could put his dog kennels—we beg pardon, houses—"all of a lump." It may rightly be argued that there are special reasons for windowless offices and stores which would not apply to the homes of the people. The reply to this is that it would be no better for a man to spend his days in a dog kennel, than to pass his nights there.

But do not let the "jerry builder" too hastily rejoice. Having gone so far, the mind wanders on. If we are condemned to work and live without light and air, why have buildings at all? Why not complete the circle and come once again to be cave-dwellers, and hew out for ourselves subterranean homes? Ere this point be reached, readers will, of course, have realized that it is electricity which is to render possible this wonderful reversion. Electricity would be there to take the place of the banished sunlight. No doubt the gas engineer, too, would fall in with the scheme. This would be necessary; for we refuse to believe that there would be universal satisfaction with the electric cooker even among the cave-dwellers. Some modification of prevalent ideas with regard to gas-works sites would, however, be called for. No more would be heard of the oft-repeated suggestion that the gas should be produced at the pit-mouth. In place of it there would be proposals to erect gas-works at the bottom of the coal pits, so as to ensure an adequate pressure to the gas consuming appliances in the subterranean homes.

A trifle far-fetched, perhaps; but not more so, we trust, than the idea that offices and stores—in which the unfortunate employees would be condemned to spend at least one-third of their working lives—should be erected without any provision for admitting the light of day.

"Logic."

The gas industry, which in its time has received many buffetings, has now to drink to the dregs from the cup of humiliation, for it has become the butt of the anonymous letter writer. The following effusion, referring to "Our Gas Supply," is extracted from last Monday's "Daily Mirror:" "The frequent gas explosions constitute a public menace demanding investigation. In my opinion, the gas supplied to-day is dirtier and gives much less light. Why is this?" The *nom-de-plume* selected for this gem was "Safety." Why did not the writer select the word "Logic?"

Co-Partnership.

The references to co-partnership and profit-sharing contained in the recent report of the Balfour Committee on Industry and Trade, in which the successful operation of schemes by gas undertakings was emphasized, are strikingly illustrated by figures relating to the co-partnership results of the South Metropolitan Gas Company, as quoted in that Company's "Journal." With the allocation of £82,624 for division between co-partners in respect of the past year's working, a bonus of 5 p.ct. on co-partnership wages of £1,645,465 has been declared. At the end of the year the co-partnership holding of stock was £602,675. The total amount paid in dividend to co-partners in respect of 1928 was £38,235, so that as shareholders and employees a sum of £120,859 was received by co-partners. The operation of the principle by which the bonus was earned also permitted an addition of 1¼ p.ct. to the 5 p.ct. statutory dividend; and to co-partners as ordinary shareholders this represented a sum of £7533. Thus is co-partnership no empty phrase.

The Example of Imperial Chemical Industries.

Following the second annual meeting of shareholders of Imperial Chemical Industries, Ltd., a meeting of the Works Councils of the Company will be held at Imperial Chemical House, Millbank. The speech delivered to the shareholders in the morning will be communicated to the workers by Lord Melchett, the Chairman of the Company, in the afternoon. This arrangement has been made in accordance with the policy of the Board to recognize the workers as co-partners in the activities of the Company. The meeting will be attended by 900 members of the Works Councils representative of, and elected by, the 53,000 workers employed by the Company.

Disposal of Ammoniacal Liquors.

This problem does not become easier with the passage of time; and our readers will be interested in an extract of a paper by Mr. D. W. Parkes which he read before the Society of Chemical Industry (Birmingham and Midland Section) on Feb. 14, and which will be found in later columns of this "Journal." He points out that any method of purifying ammoniacal liquors which aims simply at the destruction of the phenols is financially unsound; and he considers the application of the activated carbon process, by means of which the phenols are not only removed to the extent of over 90 p.ct., but are recovered to the extent of about 50 p.ct. in the form of saleable tar acids. The system he describes can be operated satisfactorily for the treatment of coke-oven and horizontal liquors, but is uneconomical for dealing with vertical liquors. However, the latter can also be purified by the same process provided the dehydroxy phenols are first removed. He remarks that, if an extensive outlet for catechol can be found, the purification of vertical liquors will become a profitable proposition.

Effect of Shale on the Strength of Coke.

At the Carbonization Conference in Birmingham last year (see "Journal" Carbonization Conference Number, Feb. 14, 1928, p. 45) Greenfield and Harrison mentioned that in a Durham coal which was ground so that 80 p.ct. passed an ¼-in. screen, and 98 p.ct. a ½-in. screen, the remaining 2 p.ct. of oversize might consist of 1 p.ct. of coal and 1 p.ct. of shale—in other words, the shale was less easily crushed than the coal. R. A. Mott, writing on the value of clean coke, in the March issue of "Fuel in Science and Practice," mentions this fact, and points out that

even with a coal which would be called finely-crushed, large pieces of dirt may persist. Such pieces of shale tend to cause fractures in the coke, and therefore reduce its mechanical strength. In nearly all Durham cokes these pieces of shale are found, whereas they are rarely found in Yorkshire cokes. This means either that Durham coals are less efficiently cleaned than Yorkshire coals, or that Yorkshire shale is more friable than Durham shale. On the latter alternative there is no information, but there seems to be some truth in the first assertion. No coking coals, states Mr. Mott, should contain pieces of shale over ¼ in. size, for these are easily removed by efficient cleaning processes, dry or wet.

PERSONAL.

We learn that Mr. G. M. Gill, who has been practising as a Consulting Engineer at 119, Victoria Street, S.W. 1, since 1922, has taken over the practice of Messrs. L. Askew & Son, of 82, Victoria Street, S.W. 1, following on the death of Mr. Leonard Askew on Jan. 26, 1929, as reported in the "Journal" of Feb. 6. His address is 82, Victoria Street, London, S.W. 1.

The wedding took place in St. Barnabas' Church, Pimlico, on April 11, of Miss Gabriel Milne-Watson, daughter of Sir David and Lady Milne-Watson, whose bridegroom was Mr. Christian William Reed, only son of Mr. and Mrs. Leicester Morgan Reed, of The Warren, Handcross, Sussex. After the ceremony Lady Milne-Watson held a reception at 73, Eccleston Square.

Mr. John Francis Crofts, Gas-Works Manager of Stone, has been returned at the head of the poll as a Member of the Stone Urban District Council.

Mr. Arthur Tennant, Hon. Secretary of the London and Southern District Junior Gas Association, has removed to "Downsview," Redstone Hill, Redhill.

Mr. James McNair, Assistant Works Engineer at the Hoboken Works, Antwerp, of the Imperial Continental Gas Association, has received a similar appointment with the British Gas Light Company at their Hull Station. He joined the Imperial Continental Gas Association seven years ago as Pupil Engineer, and subsequently became an Assistant at their Brussels Station. At a dinner given before Mr. McNair's departure for Hull, Mr. A. F. P. Hayman, General Manager at Antwerp, presented him with a solid silver cigarette case on behalf of the Higher Staff. He was also the recipient of an onyx inkstand from the staff and workmen of the Hoboken Works. Mr. McNair was under Mr. John Wilson, of Motherwell, for two years before going to Belgium.

The Recreation Room at the Roodee Works of the Chester United Gas Company was filled to overflowing on Friday evening last, when members of the staff and employees assembled under the presidency of Mr. H. Hopkinson (Secretary of the Company), on the occasion of a presentation of a grandmother clock and a cheque to Mr. Harold V. Pye, who is leaving to take up a position of Assistant Works Manager to the Peterborough Gas Company. Mr. Pye, who has been an Assistant under Mr. J. H. Noble (Engineer and Manager) for the past ten years, is the second son of the late Mr. Frederick A. Pye (the late Secretary and General Manager of the Gas Company), and leaves to take up his duties in a fortnight's time. Mr. Hopkinson said it was a pleasant duty to congratulate Mr. Harold Pye on his appointment to the position of Assistant Works Manager to the Peterborough Gas Company, and there was a unanimous desire among the employees to hand Mr. Pye something in a tangible form as an appreciation of their goodwill. The small Committee appointed had received 166 contributions, which meant that not one employee had declined. This again was indicative of the popularity of Mr. Pye. The name of Pye had been connected with the Company for a period of 75 years. The late Mr. James Pye, grandfather of Mr. Harold Pye, was appointed Secretary in 1854—four years before the first Act of the Company was secured. Next week would be the first time that the name of Pye would be missing from the roll of the Company's service. Mr. Noble said he had known Mr. Harold Pye for the last ten years, and had admired his personality and perseverance. A gas engineer's lot entailed a good deal of study and hard work. Peterborough, where Mr. Pye was going, was, like Chester, a Cathedral city, and there was a good deal in common with regard to the two gas undertakings. In asking Mr. Pye to accept the clock and cheque, he wished him every success and good health to carry out his duties, and sincerely hoped he would uphold the name of Pye in the gas industry. Mr. Pye, responding, thanked all his friends for the handsome present and their good wishes. He thought the goodwill shown towards him was to a large measure attributable to his late father's popularity; and he appreciated it very much on that account. He would look back on the time spent at Chester as the happiest in his life.

The chief mourners at the funeral of the late Mr. Charles Hunt were Mr. Clifford Holmes Hunt and Mr. Willis Holmes Hunt. There is no member of the family named Ernest Hunt.

It was stated in last week's "Journal" that Mr. Ivor Thomas had been appointed Superintendent of the Avon Street Works of the Bristol Gas Company. His position, however, is that of Assistant Superintendent.

OBITUARY.

The death has occurred at Matlock of Mr. Walter Frederick Dakin, who for the past nine years was Secretary of the Matlock and District Gas Company and the Churnet Valley Gas Company. He died at the age of 65 years, and leaves a widow, one son, and one daughter.

Mr. Thomas Gibson, the oldest Director of the Londonderry Gas Light Company, has died at the advanced age of 96. Mr. Gibson, who was a native of Gordon, Berwickshire, joined the Board as far back as 1894.

EVENING STAR CHAPTER, No. 1719.

What was reported by the Secretary as a record attendance of the Evening Star Chapter, No. 1719 (attached to the Evening Star Lodge), distinguished the installation convocation of the Chapter which took place on Wednesday, April 10, at Freemasons' Hall, Great Queen Street, London. The record was established with regard both to the members present, and to the number of visiting companions.

The principals presiding at the opening of the proceedings were: M.E.Z., Rae P. Normand, Ex-Comp Walter McDowall as H., and Ex-Comp. W. W. Hammond as J.

Comps. R. J. Meiklejohn and Ernest Scears, members of the Rectitude Chapter, No. 502, were admitted as joining members.

Each of the three retiring principals then proceeded with the ceremony of installing their elected successors into their respective chairs. The complete list of Officers for the year 1929-30 is as follows:

Ex.-Comp. Walter McDowall	M.E.Z.
,, ,, Rae P. Normand	I.P.Z.
,, ,, W. W. Hammond	H.
Comp. Frank West	J.
Ex.-Comp. Alfred C. Beal	Scribe E.
,, ,, Ralph Carr	,, N.
,, ,, Wm. A. Surridge, P.G. Std. Br.	Treasurer.
Comp. G. D. Bidwell	P.S.
,, John R. Masters	1st Asst. S.
,, J. A. Brentnall	2nd Asst. S.
Ex.-Comp. Charles Clare	D.C.
,, ,, Walter T. Dunn	Organist.
Comp. C. M. D. Belton	Steward.
,, Burt Long	,,
Ex.-Comp. R. H. Goddard	Janitor.

Bro. Thomas W. Moore, Earl of Malmesbury Lodge, No. 4919; and W.Bro. Reginald P. Chester, Tenacity Lodge, No. 4597, were balloted for and unanimously elected as exaltees. They were admitted and were each duly conducted through the ceremony of exaltation.

In appreciation of his services during the year 1928-29 a Post-Principal's jewel was presented to Ex-Comp. Rae P. Normand, who suitably expressed his thanks for the compliment.

A dinner followed in the Connaught Rooms adjoining Freemasons' Hall, over which Ex-Comp. McDowall presided. The toast of "The Grand Officers," which he proposed, was acknowledged by Ex-Comp. Surridge (Treasurer) and Ex-Comp. Godson, who is a member of the Committee of the Freemasons' Hospital and Nursing Home. In the course of his speech he made a stirring appeal for support of the Fund of a quarter of a million sterling which has just been started, having for its object the erection of a new building designed on the latest approved plans and completely equipped with every scientific accessory. The fund is to provide for the endowment of the work, so that no annual appeal shall be necessary, as is the case with the other three great masonic charitable institutions.

Eastern Counties Gas Managers' Association.—The Spring Meeting of the Association will be held in London on May 1. Motor coaches will stand in Finsbury Circus, near Liverpool Street Station, at 10.30 a.m., for conveying members and guests to the Tottenham Gas-Works. At 1.30 p.m. the members will be entertained at luncheon at the Hotel Cecil by the Chairman and Directors of the Tottenham and District Gas Company. The Chairman, Mr. Henry Woodall, M.Inst.C.E., will preside. The business meeting is at 3 p.m., at which Mr. H. C. Smith, M.Inst.C.E., will deliver his Presidential Address. Members will dine at the Hotel Cecil at 7 p.m. (morning dress). On Thursday there will be a visit to Watson House, by the kind invitation of the Governor and Directors of the Gas Light and Coke Company. Conveyances for this visit will be available outside the Institution of Gas Engineers, 28, Grosvenor Gardens, at 2 p.m.; and guests will return to the same place. Tea will be provided.

NATIONAL GAS COUNCIL.

Meeting of the Central Executive Board.

A Meeting of the Central Executive Board of the National Gas Council took place on April 9 at 28, Grosvenor Gardens, S.W.—Sir David Milne-Watson in the chair.

The Late Charles Hunt.

Sympathetic reference was made by the Chairman to the loss the gas industry had sustained in the recent death of Mr. Charles Hunt, one of the pioneers in the industry. A vote of sympathy with his relatives was passed, all standing.

Annual Report.

The draft annual report of the National Gas Council for the twelve months ended March 31, 1929, was submitted, and approved for presentation at the annual general meeting on May 14.

Joint Standing Finance Committee.

It was reported that a meeting of the above Committee had taken place on March 12, in order to review the financial position of the joint bodies, and the recommendations of this Committee were submitted and approved for adoption.

Gas Undertakings Bill.

It was stated that the Report Stage of the Bill in the House of Lords had been taken on March 21. The Bill was read a third time in the Lords on March 25; the first reading in the House of Commons being taken on the same day.

Central Electricity Board.

It was reported that the Central Electricity Board were proposing to constitute the electricity generating station at a town in the south of England one of their super-stations, and to run extra high-tension cables from such generating station out of the town. Apparently the Central Electricity Board were endeavouring to compel the Gas Company to allow these overhead cables to pass over the gas-works' buildings. In view of the importance of the question to gas undertakings throughout the country, it was agreed that the Council should take up the matter with the Central Electricity Board from a national point of view.

Federation of British Industries.

It was reported that the Federation of British Industries had appointed Mr. J. Terrace, the President of the Institution of Gas Engineers, together with Mr. S. S. Ogilvie, Joint Manager of the National Gas Council, to serve on the Pollution Sub-Committee of the Federation, and that a meeting of that Committee would take place at an early date.

British Industries Fair, 1930.

Letters were considered from the Hon. Secretary of the Gas Industries Section, and from the Secretary of the Society of British Gas Industries, respectively, requesting the Council to nominate two representatives to serve on the Joint Committee organizing the Birmingham Section of the British Industries Fair, in view of the success which attended the 1929 Fair. It was agreed to re-appoint Mr. W. J. Sandeman and Mr. L. E. Clift, who represented the National Gas Council on the previous occasion.

French Gas Association.

A letter was submitted from the President of the Union Syndicale de l'Industrie du Gaz, inviting the President of the National Gas Council to attend a Congress of the Gas Industry in France which would take place at Rouen from June 17 to 22, and extending this invitation to all the members of the Council.

Royal Commission on Transport.

It was reported that the Government had appointed a Royal Commission to make a comprehensive inquiry into modern traffic problems, and that the Federation of British Industries had set up a Special Committee to consider the question of giving evidence before the Royal Commission. This Special Committee had drawn up a detailed questionnaire dealing not only with road transport, but also with general questions under the Railways Act, 1921. It had been suggested by the Federation of British Industries that this questionnaire should be dealt with by its constituent organizations, in order that the evidence to be presented should be as comprehensive as possible. The question was referred by the Council to a Special Committee.

"Empire Mail."

It was reported that the Council had co-operated with the British Commercial Gas Association in furnishing articles for a special number of this publication, and it was hoped that members of the gas industry would purchase as many numbers as possible, which could be obtained at specially reduced terms, for circulation among their consumers.

Holborn Explosion.

The publication of the Report of the Commission of Inquiry into the Holborn Explosions and Fires was announced, and the recommendations of the Commissioners were reported.

Date of Next Meeting.

It was reported that the next meeting of the Central Executive Board would be held on Tuesday, May 14, at the Hotel Metropole, at 11.30 a.m., and that the annual general meeting would take place at 2.15 on the afternoon of the same day.

ON THE ELECTRICAL SIDE.

Objectors.

The task of providing "electricity for everybody" is one that is not without its difficulties. For some time past the country has resounded with protests against the overhead transmission plans of the electricians. This agitation has been frequently laid at the door of "vested interests;" and in certain quarters the gas industry has been singled out in this connection. Possibly this was, as we suggested some months ago might be the case, "for lack of a better dog to beat." Blaming the gas industry at that time may have appeared somewhat of a slight to a very active body—the Council for the Preservation of Rural England.

The Height of—Overhead Lines.

Now, however, an occasion has arisen which does call for some attention at the hands of the gas industry; and this it appears likely to receive. It was announced at the meeting of the Central Executive Board of the National Gas Council, which is reported on another page of this issue of the "Journal," that the Central Electricity Board were proposing to constitute the electricity generating station at a town in the South of England one of their super-stations, and to run extra high-tension cables from such generating station out of the town. Apparently the Central Electricity Board were endeavouring to compel the local Gas Company to allow these overhead cables to pass over the gas-works buildings. In view of the importance of this point to gas undertakings throughout the country, it was very properly agreed that the Council should take up the matter with the Central Electricity Board, from a national standpoint. Is the overhead transmission line, like the poor, to be always with us?

Dispute at Luton.

This is a project which is by no means universally welcomed. There are places—as recent issues of the "Journal" have shown—where the poles and cables are, figuratively speaking, not received with open arms and where we hardly think the "gas interests" hold sway. Such a place is Luton, where an inquiry has recently been held by Sir William Marwood, on behalf of the Minister of Transport, into an application by the Corporation for a compulsory wayleave for an overhead cable nearly 3000 yards long, for the transmission of electrical energy at 22,000 volts. The cable would run through an admittedly pretty district; but it is one which is sparsely populated, and a memorandum has been issued by the Electricity Commissioners urging that every possible economy in capital expenditure on transmission and distribution must be exercised when providing for the supply of such an area. Beyond this all that could be said on behalf of the overhead line was that "in the wonderful scenery of Switzerland and the Pyrenees there are things far more objectionable than the wooden poles which are to be used for this line." That is not a very convincing argument; and what it really amounts to is that cheapness is the only point that can be submitted in favour of overhead lines. If this be so, the question resolves itself, in particular cases, into one of the amount of annoyance and inconvenience to others which is justified by the monetary saving involved to the producer or consumer of the current or both. At any rate, the people of this country will not agree to be bound by what is done in Switzerland and the Pyrenees.

A Storm of Protests.

But now an opportunity is afforded those who may desire to do so to beat another dog; for the most imaginative will hardly

lay the blame upon the gas industry for the latest "agitation." Quite recently, it will be remembered, the Court of Appeal by a majority decided against the Manchester Corporation upon the question of a nuisance from their well-known Barton generating station; the emission therefrom of sulphur and sulphur compounds having caused damage to a farmer's crops. The case was one of considerable importance, because it raised the question whether occupiers of property in the neighbourhood of electricity generating stations erected under parliamentary powers possess any legal remedy for a nuisance caused to them or to their property. The farmer in question secured his remedy.

We are reminded of this case, reference to which was made on p. 782 of the "Journal" for Dec. 19 last, by the storm of protests which have been raised against the proposal to erect an electric power station at Battersea, in connection with the South-East of England electrification scheme under the Central Electricity Board. Though contracts to the value of more than £1,500,000 have already been let, these protests continue to appear in "The Times;" and the nature of the opposition fully entitles it to the most careful consideration. It is contended by the Mayors of Chelsea and Westminster and a number of other influential men representing St. Thomas's Hospital, the Royal Institute of British Architects, and the Metropolitan Public Gardens Association, that the sulphurous acid in the smoke which would be emitted would damage buildings and vegetation. The alternative suggested is that the station should be built in the Kent coalfield. The Electricity Commissioners state, in reply, that the condition has been laid down that the best-known methods of avoiding the nuisance of smoke are to be employed. This reply may seem sufficient to the Commissioners; but it is hardly likely to satisfy the objectors.

The Lesser Evil.

Many thousands of passengers who have crossed from Fishguard to Rosslare will have happy (or unhappy, if bad sailors) recollections of the Great Western Railway Company's turbine steamer "St. Patrick," and will have regretted to read of the serious fire which started aboard the vessel while alongside the quay wall at Fishguard. One press report stated that smoke first issued from the smoke-room, and that "apparently wires leading to the electric heaters had fused and ignited the woodwork." On the other hand, "The Times" said that the origin of the fire was unknown. Whatever may have been the cause, it is fortunate indeed that the fire broke out when the vessel was at the quay side, and not during the journey across from Ireland.

GAS STOCK AND SHARE MARKET.

[For Stock and Share List, see later page.]

Political considerations obtruded more noticeably on the Stock-Exchange last week, and there was a dull tone in the gilt-edged market. There is a prevailing impression that the Budget will prove helpful to business, but it is recognized that, with the General Election claiming increased public attention, any improvements will probably be of a temporary character. More attention was given to short-dated securities, and some substantial gains were registered. There was little interest in the Foreign Market; but Home Rails made some further progress. Industrials were unsettled, and, though there were some bright features, business was on a small scale.

The Gas Market continued to be well supported. There was no further improvement in Imperial Continental capital stock, which appears to have settled down at or about the 400 mark. Primitiva ordinary was marked up 2s. 6d. to 32s. 6d.-34s. 6d. in anticipation of the report and accounts expected to be issued shortly. Tottenham ordinary was also marked up 3 points to 105-108, and there were further inquiries for this stock. There were some falls—noticeably 2 points each in the Metropolitan (of Melbourne) 5½ p.ct. debenture to 98-100, and Continental Union ordinary to 118-123. It is interesting to note that the Gas Light and Coke ordinary was not affected by the Commissioners' Report on the Holborn explosion.

The following transactions were recorded during the week:

Monday.—Aldershot 4 p.ct. pref. 75¾, British 5 p.ct. deb. 95, Continental Union 120½, Croydon sliding-scale 111½, European 18¼, 18½, 18⅝, 19, 19¼, Gas Light and Coke 19s., 19s. 1⅛d., 19s. 3d., 19s. 4½d., 3½ p.ct. max. 64, 64⅜, 64¾, 4 p.ct. pref. 76, 3 p.ct. deb. 59, 59½, 60¼, 60½, 5 p.ct. deb. 101¼, Imperial Continental 394, 395, 395½, 396, 400, Primitiva 30s., 30s. 1½d., 30s. 3d., 30s. 4½d., 30s. 7½d., 30s. 9d., 31s., South Metropolitan 105½, 105¾, 3 p.ct. deb. 58½, 6½ p.ct. deb. 100, Tottenham 103¾, Wandsworth new 106. Supplementary prices, Eastbourne "B" 104½.

Tuesday.—Bournemouth "B" 12⅝, British 5 p.ct. deb. 95, Commercial 98, Continental Union 120, 121, 121½, European 18, Gas Light and Coke 19s. 1½d., 19s. 2¼d., 19s. 3⅜d., 19s. 4½d., 3 p.ct. deb. 60½, 5 p.ct. deb. 101¼, Imperial Continental 395, 396, 398½, 399, 400, Primitiva 30s. 10½d., 31s., 31s. 3d., 31s. 6d., 31s. 9d., 32s., 32s. 6d., 33s. 6d., 34s., 35s., South Metropolitan 105, 105¼, South Suburban 5 p.ct. 110, 5 p.ct. deb. 98. Supplementary prices, Bognor new con. 102½, British, Trowbridge 3½ p.ct. deb. 64½, East Surrey 5 p.ct. deb. 93, Yorktown (Camberley) new 5 p.ct. pref. 92.

Wednesday.—Bournemouth "B" 12⅝, 12¾, Commercial 98¼, 3 p.ct. deb. 56¼, Continental Union 120, European 17¾, 18, Gas Light and Coke 19s. 1½d., 19s. 3d., 19s. 3¾d., 19s. 4½d., 3½ p.ct. 64¾, 4 p.ct. pref. 76¾, 3 p.ct. deb. 59½, Imperial Continental 395, 396, 398, 399, 400, Metropolitan (of Melbourne) 5½ p.ct. deb. 99, Primitiva 34s. 3d., 34s. 6d., 34s. 9d., 34s. 10½d., 35s., 35s. 1½d., 35s. 3d., 35s. 6d., 35s. 9d., 4 p.ct. con. deb. 79, South Metropolitan 105¼, 3 p.ct. deb. 58½, 6½ p.ct. deb. 100. Supplementary prices, Hornsey 4 p.ct. deb. 73, North Middlesex 6 p.ct. pref. 108, 108½, Tottenham 5 p.ct. pref. 91, Woking new "B" 109.

Thursday.—British 7 p.ct. pref. 116, 5 p.ct. deb. 95, Commercial 98¼, 98½, Continental Union 120, European 17½, 18¼, Gas Light and Coke 19s. 1½d., 19s. 3d., 19s. 4½d., 4 p.ct. pref. 77, 5 p.ct. deb. 101¼, Imperial Continental 395, 397, 398, 399, Montevideo 107, Primitiva 34s., 34s. 1½d., 34s. 3d., 34s. 6d., 34s. 9d., 35s., 4 p.ct. con. deb. 79, South Metropolitan 104½, 104⅜, 105, 105¾, 6 p.ct. pref. 100⅛, 3 p.ct. deb. 58½, Southampton 5 p.ct. max. 79, 79½, 80, Uxbridge 5 p.ct. 94. Supplementary prices, Watford "B" 96, Woking new additional "B" 108½, 108¾, 109, Yorktown (Camberley) 5 p.ct. pref. 92.

Friday.—Alliance and Dublin 97⅞, 98, British 118, 118½, Continental Union 121, 122, 7 p.ct. pref. 124½, European 17¾, 18½, 18¼, Gas Light and Coke 19s. 1½d., 19s. 2¼d., 19s. 3d., 19s. 4½d., 19s. 5¼d., Imperial Continental 392, 395, 399, Newcastle 3½ p.ct. 17s. 5¼d., North Middlesex 6 p.ct. 107½, Primitiva 33s., 33s. 3d., 33s. 6d., 33s. 9d., 34s., South Metropolitan 105, 105½, 105¾, 3 p.ct. deb. 58½, 6½ p.ct. deb. 100½, 100½, Southampton 5 p.ct. 79, 79¼, 80, Tottenham 3½ p.ct. 107½, Wandsworth, Wimbledon stock, 118. Supplementary prices, Danish 7¾, Liverpool 5 p.ct. 95½, Rugby new 5½ p.ct. deb. 103, Tottenham 5 p.ct. pref. 89, Watford "A" 5 p.ct. 110, 110½, Woking new additional "B" 108½, 109.

Money was plentiful at the close of the week, and fresh accommodation was obtainable at 3⅜ p.ct., balances being offered at even a lower rate. Old loans were renewed at about 4 p.ct. The Discount Market was weaker, and Treasury Bills were allotted at £5 4s. 2·39d. p.ct., or 1s. 6·77d. p.ct. below the previous week's rate.

On the Foreign Exchange Market, sterling on New York was slightly more favourable at 4.85$^{7}_{16}$; Italian lire appreciated to 92.71½; Dutch florins to 12.09$^{7}_{16}$; and Spanish pesetas to 32.55½. Belgas were slightly cheaper at 34.95⅜, and French francs unchanged at 124.25.

In the absence of support Silver was easier at 25⅞d. per oz.; while Gold remained at 84s. 11½d. per oz.

The Bank Rate is 5½ p.ct., to which it was raised from 4½ p.ct. on Feb. 7. The Banks' deposit rate is 3½ p.ct., and the deposit rates of the Discount Houses are 3½ p.ct. at call and 3⅜ p.ct. at notice.

Deterioration of Gas Meter Diaphragms.—Before the 1928 Convention of the American Gas Association, Mr. J. F. Anthes, of the Brooklyn Union Gas Company, contributed, on behalf of the Chemical Committee of the Association, a paper on the "Premature Deterioration of Gas Meter Diaphragms." Tests on semi-chrome leathers showed that the best results were from those which withstood the action of boiling water for at least five minutes. Though semi-chrome-tanned leather was found to be highly resistant to deterioration, nevertheless great care and discretion must be exercised in its purchase. There are many leathers on the market to-day, it is stated, which, while sold as semi-chrome stock, are decidedly inferior to a good grade of vegetable-tanned leather. The mere presence of chromium in a leather is by no means a guarantee that it has been properly tanned. To produce a well-tanned skin, the chromium must not only be present in sufficient quantity, but it must also be combined with the collagen in such manner as to produce a substance which will be unaffected by boiling water. As a result of the investigation, the Committee recommend that semi-chrome leather be used in place of vegetable-tanned leather for gas meter diaphragms; that the skins be reasonably free from grain defects and "tick," and from flaying defects; that the leather contain at least 3·0 p.ct. of Cr_2O_3 on the dry, grease-free basis; and that the leather satisfactorily withstand immersion in boiling water for at least five minutes, and preferably fifteen.

MANCHESTER REGIONAL JOINT INDUSTRIAL COUNCIL FOR THE GAS INDUSTRY.

Visit to the Preston Gas-Works.

By the kind invitation of the Preston Gas Company, on April 10, the members of the Manchester Regional Joint Industrial Council for the Gas Industry paid a visit to the Company's new works at Lostock Hall, now in course of erection at a cost of £250,000.

The members of the Council were received by Mr. S. Tagg, J.P., the Engineer and Manager of the Company, who explained the constructional details. The area of ground purchased by the Company for the purposes of this portion of their undertaking extends to 32 acres, and there is communication with the main Leyland Road, while there will be access in other directions—one from Preston itself, and another from the east. There will be a branch siding from the main L.M.S. Railway Company's line. The gasholder at present erected has a capacity of 3 million c.ft., and the erection of two others—namely, one of 5 million c.ft. and another of 7 million c.ft.—is under consideration for the future.

Plant has been installed which is capable of handling coal at the rate of 70 tons per hour, and the ordinary working week will be 47 hours. A telpherage system has been installed for the handling of coke. There are four beds of 8 retorts each, of the vertical type, installed by Messrs. Drakes, Ltd., of Halifax. The height of the retort house is 97 ft. to the eaves, and the mechanical plant generally is sufficient to handle 2000 tons of coal in 30 hours. The coal is brought through a special railway cutting, and provision is made for 20-ton wagons to be lifted bodily. The whole of the devices used throughout the retort house are of a labour-saving type; and only five men will be required to attend to it. The installation has been designed by Mr. Tagg, and the actual construction has been entrusted to Messrs. Drakes, Ltd.

LUNCHEON.

The Members of the Council were afterwards entertained at luncheon at the Victoria and Station Hotel, Preston—Mr. JOHN LEIGH, the Chairman of the Preston Gas Company, presiding.

Alderman ASTLEY BELL, Vice-Chairman of the Preston Gas Company, in proposing the toast of "The Regional Council," said that for some years past Preston had been faced with the increasingly grave problem of the provision of a greater supply of gas to the town. The present premises afforded no facilities for expansion, and therefore it was necessary that whatever undertakings were decided upon for the future should be erected elsewhere. There was a tendency to underestimate the services which gas undertakings rendered to the community for domestic purposes, apart from public lighting. An idea of the importance of the industry could be realized when it was stated that at the present moment there was invested in it no less than 160 millions sterling of capital, there were no fewer than 8,700,000 consumers of gas, and the consumption of coal for gas-making purposes was at the rate of 18 million tons per annum. There was, moreover, yearly rendered available for public consumption, as the result of gas production, 6 million tons of coke which was eminently suitable for both domestic and industrial purposes. The census of 1924 revealed the fact that there were 108,421 persons engaged in the gas industry, of which 90,000 odd were classed as operatives, and 17,000 belonged to the technical, management, and clerical staffs. Comparison between the production of that year and the previous census year showed that 46 million pounds' worth of coal gas and water gas was produced, as compared with 30 million pounds' worth in the previous census, and that the figure of 46 million pounds' worth of coal gas and water gas compared with 17 million pounds' worth of electricity. It was, however, not possible for anyone interested in the gas industry to disregard the fact that the position generally was one to cause uneasiness. He referred to unfair and State-aided competition of electricity. The gas industry did not fear fair competititn. There was room for both industries, and plenty of work for both to do without either encroaching unduly upon the sphere of operations of the other; but there was, clearly and unmistakably, a definite attempt being made, with the assistance of the State, to establish a monopoly in the distribution of electrical energy. Properties were now being erected the tenants of which were absolutely prohibited from utilizing any source of energy for heating or lighting except electricity. It was impossible to imagine how anyone with any knowledge of the subject could delude himself into the belief that electricity was cheaper than gas. A simple sum in arithmetic should convince him to the contrary; yet there were people going about trying to influence public opinion by claiming that electricity was cheaper. Preston gas was being sold at 8½d. per therm; and in order to give an equal amount of heat at the same cost, electricity would have to be sold at slightly under ½d. per unit. In conclusion, Alderman Astley Bell paid a tribute to the good work which had been accomplished by the Manchester Joint Regional Council in creating amicable relationships between gas undertaking directorates and their employers. He could not help thinking that, if the methods which prevailed in the gas industry had been adopted and practised in other great industries, the economic catastrophes which had proved to be so disastrous to the workers of this country since the ending of the war would not have been so numerous.

Mr. J. BLADES, representing the Workers' Union, supported the toast.

Alderman F. S. PHILLIPS, J.P. (Salford), of the Employers' Side of the Council, in responding to the toast, said they were being told on every hand that the gas industry was fast disappearing; yet great undertakings like those of Preston, Manchester, and Salford were spending vast sums of money in extending their plants. Among all the methods of utilizing coal, those of the gas industry headed the list in regard to public utility. There was something like 22 p.ct. of the energy of the coal converted into gas, 50 p.ct. of the energy of the coal available in the coke produced, and 7 or 8 p.ct. of the energy of the coal available in the tar, while in addition there were other valuable products. To-day this supposedly nearly defunct industry was supplying the needs of about 90 p.ct. of the population of the country.

Mr. C. E. ROSS, of the Enginemen's and Firemen's Union, and a member of the Workers' Side of the Council, also responded to the toast.

Mr. J. BOND (Gas Engineer to the Southport Corporation) proposed the toast of "The Preston Gas Company," which was supported by Councillor J. WILLIAMS, of the National Union of General and Municipal Workers, and responded to by Mr. CHARLES EASTWOOD, Deputy-Chairman of the Preston Gas Company.

ANNUAL MEETING OF THE REGIONAL COUNCIL.

Later in the day, the Council held their Tenth Annual Meeting, in the course of which it was stated that the relationships between the employers and the employees in the industry had been of the most amicable description throughout the year.

The following members were appointed as Officers of the Council:

Chairman.—Mr. C. E. Ross.
Vice-Chairman.—Alderman F. S. Phillips, J.P.
Employers' Secretary.—Mr. J. H. Sillitoe.
Employees' Secretary.—Councillor J. Williams, J.P.
Hon. Treasurer.—Alderman Sir Wm. Kay, J.P.
Hon. Auditors.—Mr. J. H. Clegg and Mr. J. Blades.

FORTHCOMING ENGAGEMENTS.

April 20.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to Motherwell and Wishaw Gas-Works.

April 20.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Sheffield. Visit to the Orgreave Coke Oven Plant.

April 25.—BRITISH COMMERCIAL GAS ASSOCIATION.—Midlands District Conference at Cheltenham.

April 27.—WESTERN JUNIOR GAS ASSOCIATION.—Annual General Meeting.

April 27.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Annual General Meeting at Newport.

April 30.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual General Meeting at the Hotel Metropole, Northumberland Avenue, W.C.

May 1 and 2.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring Meeting at the Hotel Cecil, London.

May 2.—BRITISH COMMERCIAL GAS ASSOCIATION.—Scottish District Conference at Aberdeen.

May 2.—"B.C.G.A." Scottish Conference at Aberdeen.

May 2-3.—IRON AND STEEL INSTITUTE.—Annual Meeting at the Institution of Civil Engineers.

May 8.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Meeting of the Eastern District at Peterborough at 3.30 p.m.

May 10.—BRITISH COMMERCIAL GAS ASSOCIATION.—Manchester District Conference at Southport.

May 10.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to Exmouth.

May 16.—MIDLAND ASSOCIATION OF GAS ENGINEERS.—Visit to Shrewsbury.

May 16.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—Meeting at Cardiff.

May 24.—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.—Annual Meeting.

June 19.—ASSOCIATION OF STATUTORY INSPECTORS OF GAS METERS.—Annual General Meeting in the County Hall, Westminster: President, Mr. H. N. Barrow, J.P.

July 5.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—Visit to the Halifax Gas-Works and to the Works of Messrs. Drakes, Ltd.

Sept. 12.—NORTH BRITISH ASSOCIATION OF GAS MANAGERS.—Annual Meeting at St. Andrews.

NOTES ON NEW BOOKS.

POWER RESOURCES OF THE WORLD.*

Reviewed by T. Campbell Finlayson, M.Sc.

"The future industrial expansion of the world, if it is to be carried out on a scientific basis, or if it is to be influenced by a broad and genuinely progressive policy, must depend on a fairly accurate conception of the resources which are available in each country and the possibilities which exist for making economic use of them."

So writes Mr. D. N. Dunlop, Chairman of the International Executive Council, World Power Conference, in the preface of the monograph "Power Resources of the World." It is indeed ambitious to attempt to discuss such a vast subject within the compass of 150 pages. From the pen of an individual writer it would be an impossible task. It is only by co-operative effort of such a body as the World Power Conference that an attempt can be made.

The World Power Conference organization is but five years old, and yet its influence in matters relating to power resources is already of outstanding importance. This is to be expected when its International Executive Council can claim representatives from 46 nations. It was this organization which gave rise to the Fuel Conference held in London in October, 1928, which was undoubtedly the most important fuel conference ever held in this country.

Thus one turns to the pages of this book with the realization that the compiler, Mr. Hugh Quigley, was faced with a gargantuan task, and yet with the satisfaction that no alternative organization to the one he represents could have undertaken the work. The aim of the monograph has been to collect and co-ordinate all the information available on the power resources of the world, with a view to presenting a fairly complete picture of what is known, together with a bibliography of the principal publications which have appeared in the leading countries since 1924.

The volume is divided into five main sections, together with an introduction and conclusions. In the introduction it is pointed out that power resources belong to one of three categories. First, resources which are perpetually renewed, and are beyond all possibility of exhaustion, such as solar energy, the tide, vegetable products for alcohol production, &c.; secondly, the resources which are part of the composition of the earth, and are capable of ultimate exhaustion—such as coal, peat, oil. In a third category is placed water power.

The monograph omits discussion of the first category altogether, as being beyond computation, and attention is confined to coal resources, water power, and oil. After a chapter on general considerations, a section is devoted to coal, brown coal, gas, and oil. Tables are given showing the world's coal resources, based on the Toronto Congress of 1913, supplemented by papers at the World Power Conference, 1924. An interesting table gives the coal production in the various countries of the world from 1913-27. Dealing with gas derived from coal, the total world output is put at 400,000 million c.ft. of gas per annum. It is interesting to learn that the annual output of natural gas is nearly four times this amount. Statistics are given relating to both oil resources and oil production.

The third section is devoted to a consideration of water power, and includes a number of particularly instructive tables. Electric power production is dealt with in the fourth section. A table is given showing the electrical power production of 24 countries.

In the conclusion, a table is introduced of which certain of the figures are worth memorizing. Of the total energy produced in the form of coal, oil, and water power, the United States produces 46·3 p.ct., Great Britain 15·6 p.ct., and Germany 10·6 p.ct. Of the available resources of the world in the form of coal, the United States holds 48·6 p.ct., Great Britain 3·4 p.ct., and Germany 4·3 p.ct. In the form of oil the United States holds 16·3 p.ct. of the world's resources as against negligible figures in Great Britain; and, finally, of the computed water resources, the United States holds 7 p.ct., as against Great Britain's 0·4 p.ct. These figures are sufficiently startling, and stand without need of further comment.

The monograph concludes with a selected bibliography on the World Power Resources, 1924-28. The note introducing the section states that "the compilation of a complete bibliography of the world's power resources would fill many volumes of print." Therefore, to have covered such a subject in 74 pages of somewhat widely spaced type, relating to all forms of power in the five Continents of the world, inevitably makes the bibliography rather patchy. Taking into consideration the geographical wideness of the references, and the extent of the subject covered, the bibliography is undoubtedly unique. It is a most valuable starting point for any general investigation, but it is inadequate as the basis of any precise study.

It would be interesting to know whether the various countries were asked to supply their own outstanding references on the different subjects. At present the bibliography appears to be just a little too much the result of an individual card index. For example, would such items as "Manchester Guardian Commercial: Special Supplement on Coal Products Exhibition, 1926," and an article from the "Fortnightly Review" earn a place among some forty references covering the whole of Great Britain's coal resources, and mining and carbonization industries, if the list were subjected to consideration by (say) the Technical Committee of the World Power Conference?

Further, there appears to be a certain amount of confusion in indexing. Thus one of the eight items devoted to gas in the British Empire relates to the air drying of peat. The gas section of the bibliography is particularly weak. Again, though there is a special section devoted to peat, the most important contribution the Fuel Research Board have ever made to the peat problem—namely their report on "Air Drying"—is not mentioned, though it appears under the section "Coal, Brown Coal, and Lignite," and again, as already mentioned, under the section "Gas."

These are but minor points; but when such a large proportion of the bibliography relates to foreign publications—in which one is entirely in the hands of the compiler—particular care should be devoted to the accuracy and selection of British references in order to inspire confidence.

Study of this monograph brings out one main criticism which is admirably expressed by the compiler himself at the conclusion of his introduction. "There is no doubt that, before a moderately reliable estimate can be prepared, there must be standard methods adopted in every country for investigating and determining power resources. It is only after one method has been agreed among the principal countries of the world, and definitely adopted, that we shall come within sight of a world survey of more than academic or speculative interest."

But as an indication of resources, as a signpost to fields of development, and as an inspiration to further surveys, the monograph is invaluable. It is the first survey that has yet been made on an international scale; and it is therefore a pioneer in an immensely difficult subject. It is to be hoped that the reception afforded to this volume will encourage the World Power Conference to obtain the active support of their representatives in the various nations in the preparation of a survey of the world's resources based on standard methods, and with the resources of each country estimated by those resident therein.

* "Power Resources of the World (Potential and Developed)." preface by D. N. Dunlop, O.B.E.; published by the World Power Conference, London, 1929.

GAS CHEMIST'S HANDBOOK—THIRD EDITION.

Reviewed by H. J. Hodsman.

This handbook represents an effort made by the American Gas Association to bring uniformity into the methods of chemical control of gas manufacture and of analysis of the products and bye-products of the industry. The result of the effort commands respect and admiration for the way these things are done across the Atlantic, where the gas chemist will not often find it necessary to go outside this book for everyday information. The second edition appeared in 1922, and the present volume, with about 200 pages more, reveals extensive revision and considerable additions. The names of the Committee responsible for the book ensure that it is authoritative.

If the book is examined from the point of view of British gas chemists, its utility is found to have limitations. Those who have to sell coal products in the American market will find it useful for the methods of testing described. Those who are concerned with control of manufacture only will be deprived of this interest, and find much that is unfamiliar in the methods and apparatus described. Some of the equipment is not even stocked by British dealers.

The book is divided into four chapters—raw materials; products of gas manufacture; impurities in gas; and miscellaneous, comprising the testing of water, refractories, and general stores.

Coal and coke take the first place. Here the current methods of the American Society for Testing Materials are reproduced. No great changes have been made. These methods are the lineal descendants of the original proposals of the American Chemical Society, which have obtained an international vogue. Curiously, in the test for volatile matter, in order to ascertain whether a specified temperature of 950 ± 20° is reached, it is still recommended to use potassium chromate of m.p. 940° (?). Unfortunately this m.p. of 940° which has gone all over the world in text books of fuel analysis is mythical. Potassium chromate melts at 970°-975°, and is difficult to fuse at all in a crucible heated by a burner flame. One is led to wonder

* "The Gas Chemist's Handbook." Third Edition, 1929. Published by the American Gas Association, 420, Lexington Avenue, New York, N.Y., pp. 795; 7 dollars.

how it got into the specification in the first place, and how its fraudulent presence has remained undetected so long.

Greater precision is shown in this edition in specifying sieves, the aperture being given in " micron " units.

Considerable prominence is given to gas oil, as might be expected; but most of the tests are well known. The elaborate cracking test to measure the gas-making value of oil as given in the second edition is reproduced. No progress appears to have been made in ascertaining what determines the value of gas oil.

The section on gas analysis is entirely new, supplied by A. C. Fieldner and W. P. Yant. Occupying 223 pages, it is a veritable text book on gas analysis in general, and as representing the experience of the American Bureau of Mines is most valuable. Unfortunately it deals with gas analysis apparatus of constant pressure types only. Constant volume methods, which have been almost standard practice in British laboratories, are barely hinted at. An interesting feature is the inclusion of the methods of automatic determination of CO which have been so extensively developed in America to control the ventilation of mines and tunnels.

In the section on ammonia, tar, and light oil, some changes are to be noted, but these are not extensive. Some additions are observable in the chapter on the impurities in gas. The Tutwiler burette for the determination of H_2S in unpurified gas might be more frequently used in this country. Moreover the U.G.I. colorimetric test for the determination of small quantities of H_2S in gas should be of use in the purifier house, as it enables a quantitative determination to be made by inspection.

In conclusion, it must be said that the procedures described in this book are frequently inapplicable here for reasons already given. Standardization has already advanced in other directions and is continuing. But as recording the tried experience of American chemists, the book is valuable, and much of it is applicable here. At the end of the book there are 40 pages of tables of useful data, and these strengthen its claim to a place on the shelves of a well-equipped laboratory.

TAR PROBLEMS.

Discussion before the Society of Chemical Industry.

A Joint Meeting of the London Section and the Fuel Section of the Society of Chemical Industry was held at Burlington House, London, on Monday, April 8—Mr. W. J. A. Butterfield (Chairman of the London Section) presiding.

Two papers were read, the first being on " Free Carbon Formation in Tars and Pitches," by Mr. W. Gordon Adam and Mr. J. S. Sach. Owing, however, to the illness of Mr. Adam, the paper was read by Mr. F. M. Potter.

FREE CARBON FORMATION IN TARS AND PITCHES.

By W. Gordon Adam and J. S. Sach.

The paper pointed out that all high-temperature coal tars and the pitches derived therefrom contain a varying percentage of insoluble matter, the so-called free carbon. The free carbon content of a tar has usually been considered as the material insoluble in connection with organic solvents, generally an aromatic compound. The solvents usually employed in analytical determinations are carbon disulphide, benzene, toluene, aniline, and pyridine; but except in the work of Hodurek and of Berl and Schildwachter, there does not appear, said the authors, to have been any attempt to differentiate clearly between the results obtained with different solvents—for example, toluene and pyridine. The results given in the present paper were extracted from work undertaken by the Gas Light and Coke Company, with a view to classifying the known methods of tar distillation with respect to their free carbon formation characteristics; it being recognized that the higher the free carbon formation during the distillation process, the lower the yield of the relatively valuable creosote oil, and the higher the yield of the less valuable standard softening-point pitch. High pitch yields are accompanied by a degradation in the quality of the pitch; the free carbon content increasing and the volatile matter decreasing. In the course of this week it was found that the character of the solvent employed is a much more important factor in the examination of pitch than of tar; and an attempt has been made to classify the results obtained with aromatic hydrocarbon solvents (benzene and toluene) and with aromatic base solvents (aniline and pyridine), and to show the effect of the time and temperature factors in the distillation process on the results obtained with these two classes of solvents.

The so-called free carbon present in the crude tar is derived mainly from the decomposition of the volatile matter of the coal in the retort or oven by the radiant heat or by the sensible heat of the retort surface, and rises with increasing temperatures and times of exposure of the vapours thereto. Thus horizontal retort tars are usually distinguished by the relatively high free carbon content as compared with coke oven and vertical retort tars, but the percentage of free carbon in horizontal retort tars may vary widely with the free space in the retort and with the temperature of the retort heating flues. Hodurek has distinguished the actual suspended matter in a crude tar, to which he gave the symbol C_1, from the matter precipitated by benzene, which he called C_2 and assumed to be of a bituminous resin nature. Thus the percentage figure usually returned in this country for free carbon represents the total $C_1 + C_2$; and it had been found by the experiments carried out by the authors that the ratio of the original insoluble matter C_1 to the total matter insoluble in benzene, $C_1 + C_2$, varies with the nature of the tar.

Experiments in the laboratories at Beckton show that benzene and toluene give closely similar results for the insoluble matter $C_1 + C_2$; and this is in agreement with the method for free carbon determination recommended by the Joint Tar Testing Committee, and adopted by the British Road Tar Association in the Analytical Appendix to their Standard Specification.

Distillation of Tar at Beckton.

After giving tables of results obtained from the experiments, the authors suggest that the results indicate that while toluene might be a suitable solvent for the practical examination of crude tars, it is not a suitable solvent for the differentiation of samples of coal tar pitch unless used in conjunction with the parallel determination employing pyridine as the solvent. The large-scale method of distillation of tar to oils and pitch in use at Beckton consists of a dehydration stage, employing Wilton coils, followed by further distillation in pot stills—a method originally adopted to enable the plant to cope satisfactorily with crude tars of relatively high free carbon and water content. The period of distillation in the continuous Wilton coils is 20 minutes, and in the stills 6 to 7 hours. Passage through two Wilton coils in series may be employed for the preparation of soft pitches or heavy tars for road-making purposes. The formation of insoluble matter during these stages of distillation was examined; the figures being calculated in all cases back to the crude tar. Results showed that, during the dehydration stage at 170° C., no insoluble matter is formed; the ratio of the figure for the dehydrated tar to that for the crude tar being substantially unity. The passage through the second coil tends to give rise to an increase in the insoluble matter content. At a later period the study of the second stage of the distillation was completed, and for comparison similar tests were made on vertical and horizontal retort tars, employing the Wilton coil and pot still, and on coke oven tars employing double pot stills and also a Hird continuous unit. This work showed that while the pyridine insoluble matter C_1 remains practically constant—except in the vertical retort tar, where there is a definite increase—there is a very marked increase in the toluene insoluble matter. Further, the increase in insoluble matter is higher in the case of the vertical retort tar than for horizontal retort tar under similar conditions—*i.e.*, the higher heat treatment of the tar vapours in the horizontal retort have rendered them relatively stable at the distillation temperatures. The figures for the coke oven tars show that the period and temperature of distillation are important factors.

It being found impossible to vary the working conditions of a manufacturing plant to the extent necessary, a series of heat treatments were carried out in the laboratory using an autoclave; and on the basis of the information obtained and a general knowledge of the desired requirements of a modern tar distillation plant, a unit has been designed (British Patent No. 303,038), the object being to prevent as far as possible the formation of free carbon. The Crude Tar Panel of the Standardization of Tar Products Tests Committee has designed a 5-litre iron still directly heated by gas for laboratory work; and certain tests were carried out with this apparatus, the results of which were given in further tables in the paper.

The figures given confirm the authors' previous impressions of the behaviour of horizontal retort tar, vertical retort tar, and coke oven tar when subjected to the same process of distillation. They show how local heating can be avoided, and at the same time further strengthen the estimation that the matter insoluble in pyridine is the actual suspended matter in a tar or pitch.

The results of further experiments are given in the paper;

and though circumstances have prevented the completion of the work, it is suggested that sufficient evidence has been obtained to allow the following conclusions to be made:

1. The formation of pyridine insoluble matter in a tar during distillation indicates local overheating. In a modern distillation unit the formation ratio should approximate very closely to unity.

Factors favouring the desired result are:

(*a*) Minimum final temperature in the tar obtained by employing a high vacuum or by the use of free steam. The latter method also assists by improving the agitation of the tar, thus assisting to prevent local overheating. For distillation to briquetting pitch, final tar temperatures should not exceed 280° to 300° C.

(*b*) The time of exposure of the tar to the maximum temperatures should be reduced to a minimum, a result obtained by continuous distillation methods, particularly in a coil type unit.

2. The formation of toluene insoluble matter during distillation may be reduced by employing a plant designed with recognition of the factors (*a*) and (*b*) above. The formation ratio is, however, very largely dependent upon the history of the tar prior to re-distillation. The lower the temperature employed in the coal carbonizing process, the higher the alkali soluble content of the tar, and the greater its tendency to form toluene insoluble compounds during distillation. It would appear that the so-called bituminous resin compounds formed during the tar distillation are derived, not from the saturated or unsaturated hydrocarbons, but from the alkali soluble fraction.

Discussion.

The Chairman asked if the authors had investigated the action of paraffin hydrocarbons as solvents, or rather precipitants, of the so-called free carbon. How much more resinous matter was precipitated when, for instance, pentane or hexane was used as the extracting agent? In the case of the less stable vertical retort or low-temperature tars, had the authors any data indicating that the so-called free carbon content varied with the ageing of the tar on storage? He believed there was some evidence that the amount of C_2 matter changed by storage.

Mr. H. Hollings (Gas Light and Coke Company) said that, though it might be emphasized that the amount of free carbon in tar was dependent upon the type of carbonization plant used and on the way the plant was operated, it must be accepted as a fact that the technique of carbonization had to-day reached a point at which the tar distiller must accept the free carbon in tars as the gas-maker sent them out. In other words, they had arrived at a point where it was very unlikely that any change would be made in carbonization conditions for the sake of the pitch, because the value of pitch was very low compared with that of the other products of carbonization. At the same time, it was satisfactory to know that the conditions of formation of free carbon during the distillation of tar were now so well under control.

Prof. G. T. Morgan remarked that the paper must be regarded as a standard work on the subject, and one of the greatest possible help to those studying any portion of tar distillation. It had been shown in the paper that the conditions under which the so-called free carbon was formed had been more or less standardized. Had the authors gone to the length of making any ultimate analyses of the C_1 and C_2 materials, because it seemed to him possible that the so-called C_2 material was really the resins? It certainly would be interesting to know to what extent these two were compounds rather than elements, though this was of academic rather than practical interest.

Dr. R. Lessing observed that the practical question was the value or lack of value of the C_2 material. It seemed that it was impossible to prevent the formation of C_1, and there was the question of whether C_2 was valuable from the point of view of tar for road-making purposes. He gathered from the paper that the authors regarded C_2 as undesirable, and preferred to keep it low. If so, then the logical conclusion was to adopt methods of pitch production by which an increase in this ratio would be avoided entirely; and this could be done by avoiding distillation by high temperature, and adopting processes of extraction. He had been working in this direction for a good many years; and it seemed to him that extraction processes would be useful if the formation of C_2 was to be avoided.

Dr. A. Parker suggested that the 5-litre iron still mentioned in the paper was liable to introduce slight errors in results, or at any rate difficulties in arriving at absolutely accurate results, and might occur from having to rely upon judgment rather than precise measurement. A great deal would depend upon the position of the ring burners and the height of the flame; and it would be necessary for the same operator to be engaged in order to ensure repetition of results. Possibly the Committee would consider some form of standardizing the method of heating.

Mr. W. E. Cone asked what was the effect of free carbon from the point of view of the use of tar for road purposes, because tar was rapidly assuming a position in regard to road making which would make it much more valuable than pitch for briquetting purposes. What was the effect of the free carbon on the adhesive properties of the tar in relation to the aggregates used in road making? Personally he believed it would prove to have valuable properties from the point of view of adhesion. This was seen in some experiments carried out by the British Road Tar Association on a road in which the tar used for the macadam contained from 15 to 22 p.ct. of free carbon. During a period of 18 months, 25,000 tons of traffic had been carried over that road; and the Engineer and Surveyor had reported that the experiment had been entirely successful. That seemed to be a fine example of the value of free carbon.

Dr. W. R. Ormandy said that an interesting commentary on what the last speaker had said was the fact that the paper mentioned the taking out of a patent to prevent the formation of C_2.

Mr. Potter, replying to the discussion, said that those in the tar industry were still optimistic; and though pitch now had a very low value as compared with a few years ago, it was believed that by improving scientific methods there would be a change, and that the industry would have to turn from producing a briquetting material or even material for preserving timber to the question of motor fuel production, for example. As to the value of C_1 and C_2, the industry was out to make profits, and at the moment oil was more valuable than pitch; and therefore the endeavour was to get the maximum financial return possible by obtaining a high yield of oil and a lower yield of pitch. On the other hand, if there was definite evidence the other way, other methods would have to be considered. The determination of the real value of different tars for road making and briquetting was difficult. It might be that different ideas with regard to the distilling plant would be developed when further information was obtained. The object of the paper was to draw attention to the fact that the results hitherto obtained on this question of free carbon tended to be misleading.

AQUEOUS LIQUORS FROM LOW-TEMPERATURE CARBONIZATION OF COAL.

By D. D. Pratt, of the Chemical Research Laboratory, Teddington.

In this paper the author gave an account of work carried out at Teddington in collaboration with Dr. G. T. Morgan and Mr. A. E. J. Pettet, which was referred to as a logical extension of the work already done upon the study of low-temperature tars, and as an aspect of this research which requires more attention. It was pointed out that the employment of steam in many processes leads to the production of large quantities of aqueous liquors, the contents of which cannot be overlooked in any estimate of the yields obtained by decomposition of the coal. The only record of the study in any detailed manner of the constituents of liquors is that of Brittain, Rowe, and Sinnatt, of the Fuel Research Station, who, though handicapped by small quantities of materials, recorded the identification of several compounds.

The paper described the work done with two types of aqueous products—viz., one from the hydraulic main of a carbonization plant, and the other from the distillation of the tar. The source of the supplies of what were referred to as liquor and distillate was H.M. Fuel Research Station, which supplied 100 gallons of liquor and 100 gallons of distillate, and also full details regarding the coal used and the method of carbonization. Complete details of the experimental apparatus and methods employed were given; continuous extraction by ether being the method adopted. It was shown that the total ammonia content, which in the case of the liquor is 0·55 p.ct., is increased threefold in the distillate. The sulphur content is increased slightly in the distillate as compared with the liquor, and on acidification by mineral acid the liquor yields hydrogen sulphide and the distillate sulphur dioxide and elemental sulphur. Aniline, pyridine, and α-picoline have been isolated from both the liquor and the distillate. Resinamines occur to a small extent in the bases from the liquor. Formic, propionic, *n*-butyric, and *n*-valinaric acids have been identified; and acetic, oxalic, and resinolic acids have been isolated from the acids of the liquor. Phenol occurs to the extent of 0·15 p.ct. of the liquor and 0·2 p.ct. of the distillate, while catechol was present in amount corresponding to 0·1 p.ct. of the liquor, but was only detected in traces in the phenols from the distillate. A new class of resin (resinolic acids) has been characterized and isolated from the phenols of the liquor, while resinols mixed with resinenes occur in the viscous portion of the phenols from the distillate. It is hoped to present at a later date the results of further examination of the products isolated.

The coal from which the liquor and the distillate were obtained was of a non-caking type derived from the slate section of the Warwickshire thick seam (Keresley Colliery); the ultimate analysis being ash 4·5 p.ct., carbon 76·08 p.ct., hydrogen 5·05 p.ct., nitrogen 1·0 p.ct., sulphur 1·14 p.ct., difference (oxygen and errors) 12·23 p.ct. The mean C : H ratio was 15·1 : 1. The coal was carbonized at 625° in vertical retorts of the D type (a modification of the E type described in H.M. Fuel Research Technical Paper No. 17). During carbonization, steam was introduced to the extent of 10·72 p.ct. of the coal, which as charged had a moisture content of 8·98 p.ct. The yield of liquor was 59·5 galls. per ton of coal, and of this amount 16·86 galls. represent water of decomposition of the coal. The yield of tar, which was separated from the liquor in a labrynth separator, amounted to 21·7 galls. per ton of dry coal. On distillation up to 170° (vapour temperature) the tar yielded, together with light oil, an aqueous distillate averaging 7 galls. per ton of tar.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Spring Meeting in Alloa.

The Spring Meeting of the North British Association of Gas Managers was held in the Town Hall, Alloa, on Friday, April 12—Mr. J. W. Napier, the President, was in the Chair. There was an excellent attendance of members; a company of over 190 being entertained later in the day by the Provost, Magistrates, and Councillors of the Borough of Alloa.

A Civic Welcome.

The President, in introducing the proceedings, said that when the members of the Alloa Town Council learned that the North British Association of Gas Managers were to hold their annual meeting within the burgh, they decided to extend a civic welcome and to show that hospitality for which the district was noted. He was sure that the compliment which the Town Council desired to pay to the Association would be appreciated.

Provost Moir, of Alloa, said it gave him and his colleagues of the Town Council great pleasure to extend a hearty welcome to the members of the Association. It was a hundred years since they started the gas industry in Alloa, so that this year they were celebrating their centenary. It was now fifty years since the private undertaking of the Gas Company was acquired by the Corporation. Thus, besides being a centenary, it was also a jubilee occasion. He well remembered when the gas undertaking was acquired, because both his father and his uncle were shareholders in the old Company; and he knew they thought they had made an excellent bargain in selling the concern to the Town Council. When in 1902 the management of the undertaking was taken over by Mr. Napier, the output was 80 million c.ft., but now it had increased to 200 millions per annum. This increase had taken place, despite the fact that there had been no great advance in the population. He regarded it as a noteworthy fact that during the hundred years they had only had four Gas Managers. To his mind this proved two things—first, that the Managers were appreciated, and were themselves men of capability. It proved, too, that the relationships had been most harmonious. He need not refer to the popularity of the present Manager. This was proved by the fact that he was this year the President of the North British Association of Gas Managers. The industry they represented was one of the best in the country.

The President said that, on behalf of the Association, he had to thank Provost Moir for his kindly welcome. He could assure the Provost that his remarks had been appreciated. It was true that Alloa's gas undertaking had been successful; but even so, they were looking forward with confidence to a greater measure of success in the future. One of the things that struck him last year while on a visit to America was the extraordinary progress with regard to the sale of gas. No doubt electricity was a powerful competitor in America, but it was of great interest to him to observe that gas was making progress at a more rapid rate. In the city of Chicago, for example, the output of gas had doubled in ten years. In most of the other cities he visited he found the same satisfactory conditions.

Presentation to the President.

Mr. H. H. Gracie, of Edinburgh, said the members of the Association would recollect that at the September meeting Mr. Napier was unfortunately not present. Consequently the presentation of the memento of his year of office had been delayed for a few months; and he (Mr. Gracie) had pleasure in handing over the gift now.

The President thanked the members of the Association for the gift. He remembered the occasion when these insignia of office were created. It was in memory of Mr. McGilchrist, who was an outstanding personality in the industry. It was well that they should cherish the memory of a man whom they all admired.

The President's Address.

The President then delivered his Address, which will be found on later pages of this issue.

Vote of Thanks.

Mr. David Fulton, of Helensburgh, moved a resolution thanking the President for his Address. Mr. Napier, he said, was no slave to tradition; and, as they expected, they had received something unusual in the way of a Presidential Address. The Association ought to feel proud that they had a President of the ability of Mr. Napier. The tests of an address were that it should interest an audience and that it should compel thought. The address given to them that day satisfied both these requirements.

Mr. H. G. Ritchie, of Falkirk, seconded the vote.

The President, responding, thanked the members for their enthusiastic interest in his address, and said he was grateful to Mr. Fulton for the congratulatory remarks he had made. His hope was that the address would bring fresh thought in support of co-ordination.

The Institution's New Secretary.

The President directed the attention of the members to the fact that the new Secretary of the Institution of Gas Engineers was present, and he would like them to give Mr. Campbell a welcome. [Applause.]

Mr. J. W. Campbell thanked the President and the members of the Association for the heartiness of their reception.

Vacancies in the Council.

For vacancies in the Council the following were proposed: Messrs. George Braidwood, Coatbridge; R. M. Simpson, Denny; G. Bruce, St. Andrews; J. Dickson, Kirkintilloch; A. Dow, Galashiels; T. Royden, Uddingston; W. A. Dearden, Johnstone; and S. Dickie, Dumfries. The ballot will be taken at the September meeting.

Luncheon.

After the business meeting the members of the Association were the guests of the Provost, Magistrates, and Town Council of Alloa at luncheon in the Town Hall. Provost Moir presided.

"The Town and Industries of Alloa" was proposed by Treasurer Harvey, of Edinburgh; and Capt. J. P. Younger briefly replied.

Mr. W. E. Whyte, O.B.E., J.P., in submitting the toast of "The Gas Industry," said that one realized from a casual inquiry into the industry and its manufactures that it was an industry of no mean magnitude or importance. In speaking of the gas industry, he had to make reference to the number of gas-works distributed throughout the country. In all there were between 1300 and 1400, while the industry carbonized some 18 million tons of coal per year. The industry therefore might fairly claim to be one of the greatest industries of the country. It was also interesting to see what it had done in the matter of development. The supply of gas to the consumer within the last twenty-five years had more than doubled; therefore he thought they might claim that the gas industry was very virile. But, important as it was, it was not receiving the support and encouragement that it should from the Government. A great measure of freedom and advancement were necessary. As regards the price of gas, the Government seemed to look askance on the industry, but they appeared to be attracted by the intriguing claims of electricity. He thought that some of the claims made for electricity could never be realized. It should never be permitted to any Government to advance one particular industry to the detriment of another, particularly when one industry had rendered no great national service. At the general strike two years ago the gas industry was the one industry which maintained to the fullest its public service. He did not think enough was being made for the claims of amalgamation. He considered that the time was opportune for a greater joining-up one with another. The gas industry deserved well of the country. They required up-to-date legislation to give them that freedom which would make for public development; and he hoped that in all districts throughout Scotland every effort would be made to see that Parliament would require to pass that legislation. The gas industry had still a great deal to do for itself; and it was up to them to make a great effort for unison, and, by joining its forces, bring about results which, he was certain, could be secured in the future.

Mr. J. W. McLusky, in responding to the toast, said that one of the best things the gas industry had done was to bring to their ranks Mr. Whyte. Continuing, Mr. McLusky said that, to enable the industry to forge ahead, they required to let every class of consumer have gas when they desired it, and to give it to them at a suitable price. Mr. Napier, he said, had increased his output from 80 million c.ft. in 1902 to 200 millions. The gas industry throughout the country during that time had increased its output by 100 p.ct. Alloa had increased theirs by 150 p.ct.; and Mr. Napier was to be congratulated on that result, as he sold 150 p.ct. more gas with an increased capital of 50 p.ct. This result could not be obtained without having been carefully studied.

In the course of the day many members of the Association took the opportunity of visiting the Alloa Gas-Works.

Chadwick Public Lectures.—A lecture, illustrated by lantern slides, on "What Health and Civilization owe to Engineering" will be given by Mr. C. E. Stromeyer, O.B.E., M.Inst.C.E., at the Institution of Mechanical Engineers, Storey's Gate, Westminster, on Tuesday, April 23, at 8 p.m. Mr. W. E. Riley, F.R.I.B.A., M.Inst.C.E. (Chadwick Trustee), will preside. All information about Chadwick Public Lectures can be obtained from the Secretary, Mrs. Aubrey Richardson, O.B.E., at the Offices of the Chadwick Trust, 204, Abbey House, Westminster.

CARBURIZING WITH GAS.

By P. H. WALLER, of the Pacific Gas and Electric Company, San Francisco

From an Article in the "Gas Age-Record" for March 9.

Carburizing is generally referred to as case hardening, and usually is applied to ordinary straight carbon basic open hearth steel. It is a process whereby the steel to be treated is brought up to a temperature of from 1400° Fahr. to 1800° Fahr. in close contact with gases of which carbon monoxide is the most important. These gases penetrate the outer surface of the steel and form a case containing enough carbon so that it may be chilled, thus forming a very hard surface and leaving a tough but malleable inner core. The depth of the carbon penetration or case depends on the length of time the steel is subjected to the carbonic gases, the operating temperature, and the medium used to produce the carburizing gas.

Two methods are employed—namely: (1) Compound method, where a compound such as bone charcoal or leather charcoal is used; and (2) gas method, where gas is used as the carburizing medium.

Uniform temperature is of paramount importance. The carburizing temperature must be maintained throughout every piece without fluctuation, and the heat must be applied in such a way that it may be quickly and accurately controlled. Because of this and the fact that gas is cleaner, less expensive, easier to control, and an excellent carburizing medium, many manufactureers have either converted their present furnaces or purchased new ones for using gas.

Adequate and efficient pyrometer equipment is required to indicate the correct temperature of the pieces themselves. This is necessary, inasmuch as the lowest temperature at which the material may be economically carburized to any given depth is the best temperature to use.

Visible case of the required depth in a given time is not necessarily the best case or even a good case. The best case should not be over 1 to 1·10 p.ct. carbon content, and shoulu diffuse into the core without a sharp line of demarcation at the junction. A proper case will be free from all foreign matter, such as phosphorus, sulphur, &c., and be of a dense "tough hard" nature. There are two kinds of hardness, "brittle hard" and "tough hard." The latter is an asset, and care must be exercised in obtaining it. Here again gas has its advantages. Because of the ease and accuracy with which gas may be controlled, it is not necessary to use highly skilled labour. The "brittle hard" may be the result of phosphorus, manganese, sulphur, improper treatment, and various causes. Care in selecting the medium for carburizing is therefore very important.

Carbon monoxide is the most important of the gases for carburizing. A material may be an excellent carburizer and still contain very little carbon. For instance, anthracite coal contains about 85 p.ct. of carbon, but is a very poor carburizer, whereas gas contains a much smaller amount of carbon, but is an excellent and rapid carburizer. Gas is always ready, inexpensive, controllable, and cleaner than compounds; there is no waste, and, more important, gas is an unvarying product that may be relied upon to produce the same results time after time.

The following is from a test to determine the operating data on a gas-fired carburizing furnace, using gas as the carburizing medium. This furnace was built by the writer for the Western Harvester Company, of Stockton, Cal., manufacturers of "Holt Combined Harvesters." The data include length of time for carburizing, temperature of retort, and quantities of gas used for carburizing and heating.

The furnace is cylindrical, containing a retort 3 ft. in diameter and 3 ft. deep, made of ¼-in. steel plate, and having a cast-iron cover. In the combustion chamber, four sets of six burners each fire in a space of approximately 5 in. between the retort and the firebrick wall of the furnace. The furnace is insulated with 3 in. of "Sil-o-cel-C_3" concrete, inside an ⅛-in. steel casing. The retort rests on several firebricks, so that there is a circulation of the products of combustion under the retort. The flue gases are vented through a cover which closes the top of the furnace, and is about 3 in. above the cast-iron cover of the retort. This construction allows uniform heating, because all surfaces of the retort are exposed to the products of combustion.

The process of carburizing is briefly described as follows: The steel being carburized is placed in the retort and gradually heated to a temperature of 1650° to 1700° Fahr., at which temperature it is held for a period of from four to twelve hours depending on the depth of case desired. When the temperature of the furnace reaches approximately 600° Fahr., town gas is passed into the retort by means of a connection at the bottom, and is permitted to escape through a connection at the top.

Two test runs were made, one covering a period of twelve hours actual carburizing time, and one a period of eight hours.

Twelve plough disc hubs weighing 58 lbs. each, or a total of 696 lbs., were placed in the retort and brought to a temperature of 1675° Fahr. in approximately three hours. Carburizing gas was passed through the retort, beginning at a temperature of 600°, and continuing after the burners had been shut and the material allowed to cool in the furnace back to 1450°. The temperature of the retort during the carburizing period gradually decreased from 1675° to 1540° as the burners were adjusted to a capacity which was not quite sufficient to maintain a temperature of 1675°. The average temperature for the entire carburizing period was 1630°. The total amount of gas required for heating purposes during the test amounted to 7300 c.ft. The gas passed through the retort as a carburizing agent amounted to 4300 c.ft. This makes a total of 11,600 c.ft. for the entire operation.

—	Bar No. 1.	Bar No. 2.
Weight after	156·723 grammes	156·410 grammes
Weight before	156·160 ,,	155·840 ,,
Increase	0·563 gramme	0·570 gramme

Scleroscope hardness of bars, 85–90. (Bars were commercial cold rolled steel.)

Two test bars, ½ in. by 5 in., were wired together and placed in the retort next to the shell. These were accorded the same treatment as the main load. (After allowing the load to cool sufficiently for handling, it was placed in the gas furnace, reheated to 1500° Fahr., and then quenched in water.) Upon breaking the bars it was found that they had a depth of case of about $\frac{5}{32}$ in. The bars gained weight as shown in the preceding table.

EIGHT-HOUR TEST.

Eleven plough disc hubs, weighing 58 lbs. each, or a total of 638 lbs., and twenty test bars, weighing approximately 40 lbs., were placed in the retort and brought to a temperature of 1700° Fahr. in about two hours and thirty minutes. Carburizing gas was passed through the retort beginning at a temperature of 1000° and continued until the heating burners were shut off. The retort and its contents were maintained at a temperature of 1650° to 1700° for a period of eight hours. A total of 7300 c.ft. of gas was required for heating purposes, and 1850 c.ft. was passed through the retort. This gives a total of 9150 c.ft. of gas for the run. During the run test bars were removed from the retort at the end of 2, 4, 5, 6, 7, and 8 hours from the time the retort reached a temperature of 1675°. All other test bars were removed at the end of the 8-hour run.

Two test bars, ½ in. by ½ in. by 5 in., of commercial cold rolled steel were weighed before and after carburizing. The depth of case was about $\frac{1}{16}$ in. The bars gained in weight as follows:

—	Bar No. 3.	Bar No. 4.
Weight after	156·1405 grammes	154·584 grammes
Weight before	155·777 ,,	154·2345 ,,
Increase	0·3635 gramme	0·3495 gramme

This increase in weight is 63 p.ct. of that gained by the test bars which were used in the 12-hour run, and, therefore, the increase in weight is directly proportional to the carburizing time. The tests showed that the product is uniform, regardless of shape or weight of piece, or its location in the furnace.

The furnace as designed and built has a capacity which is sufficient to carburize approximately 1500 lbs. of large pieces. With the eleven hubs which were carburized during these tests less than half the capacity of the retort was used. The time required for loading the material in the retort and preparing the furnace for firing during this test was about 15 minutes. Suitable equipment, such as an air hoist operating on a track above the furnace, would permit quenching of even very large pieces directly from the furnace, thus saving one reheating operation. During the second test 13·5 c.ft. of gas were used per pound of steel carburized, which, at a cost of $0.72 per 1000 c.ft., would amount to $.0098 per lb. of steel, or about 1 cent. Inasmuch as less than half the capacity of the furnace was used, this figure could no doubt be materially reduced if the furnace were operated with a full load. It would, therefore, appear that the use of gas in a furnace of this type is entirely feasible and decidedly economical. With a varying production it would perhaps be desirable to have one or more furnaces of different sizes to render it unnecessary to utilize a large furnace when only a small quantity of material is to be carburized.

CO-ORDINATION OF GAS SUPPLY IN SCOTLAND.

Presidential Address of J. W. NAPIER, of Alloa, before the North British Association of Gas Managers.

In seeking to review the position of gas supply in Scotland and the present-day situation whereby a large number of individual undertakings are separately existing, it is important to indicate future policy by the following extract from the memorandum prepared by the National Gas Council and presented to the National Fuel and Power Committee.

> The cramped view of the Legislature in the past in regarding the gas industry as consisting of a large number of independent self-contained units catering for a single need of a limited community, rather than regarding it as a national industry performing national services of the greatest value, has been found to be demonstrably untenable to-day. Progress in the science and technique of gas manufacture and supply has made it not only possible, but in many cases an economic proposition, for an undertaking to extend its area to supply beyond the confines originally contemplated by Parliament. The gas industry must to-day be regarded as a coherent whole rather than as an aggregation of scattered and unconnected undertakings.

Again it is given forth in the Report of the Coal Commission:

> The point of importance is that no obstacle, whether of State regulation or of industrial organization, should be placed in the way of the development (of fuel industries) . . . in whatever manner engineering and chemical skill and the economic conditions may indicate the most suitable.

The following observations are taken from the Report of the National Fuel and Power Committee, and which have a bearing on the question of unification of gas supply and coke oven interests. In following the evidences stated by the Committee, the two coal supply areas, Lanarkshire and the Lothians, with Glasgow and district and Edinburgh and district as the centres of greatest population, occur to one. There are heavy demands for coke and gas supplies in these two centres. The Committee state that the industrial interests involved, in particular the iron and steel industry, so intimately connected with coke production, are varied, and consist of a large number of independent units, and they see no likelihood of a survey of the question of the necessary width being made except by Government. Such survey should in their judgment consider the disposal of the coke, the location of coke oven plants with respect to iron and steel works, and the existing and potential consumption of coke whether for the iron and steel industry or for domestic purposes. A survey of the kind is recommended. As regards gas, the Committee observe that, apart from the technical questions, a gas supply network involves many difficult administrative problems. The investigation suggested would ascertain the present consumption of gas in the area; the amount of coke oven gas available for distribution and its possible uses; the developments of demand for gas, present and potential; and the cost of installing gas mains to interconnect the various gas producers and distributors.

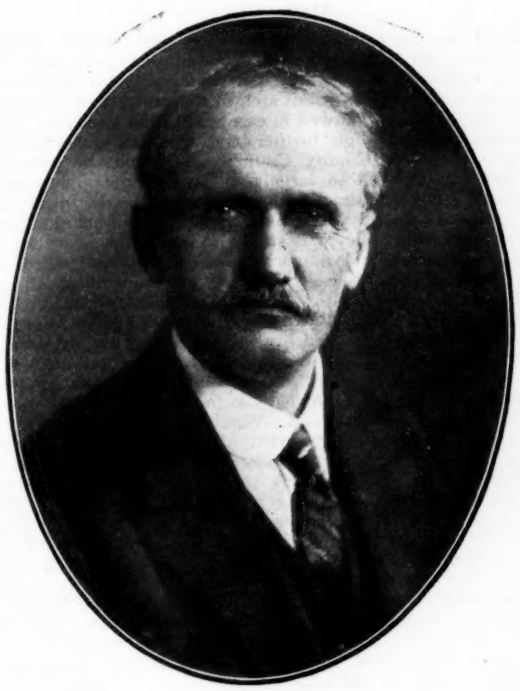
In what might be described as the political world of industry, the dominating influence of men's minds in the present day is directed towards concentration of effort and a realization of unification in the field of commerce; a co-ordination of effort through the multiple influence of single agencies grouped together for mutual protection and for economic result. Science has become the guiding and forcing instrument whereby it is possible for a particular industry working in separate units to unify and collate in one establishment of agreed-upon policy the manufacture and sale of goods. This conception, however, may be a danger, just as it may be a success, when driven in high state into the arena of industry. But all this is in the fate of things, and no good can result without experience. Experience is the best trial master; and so men and things move onward sinking their failures and seeking after the best.

The gas industry in its practice of manufacture has made great advances. The practical side of affairs has been given elaborate attention with successful result. In fresh and extended uses for gas, a feeling of modesty probably prevents the true values being realized even by many of us who are inside. We have advertised with good result the product we sell, and the public know a great deal of the good that gas can accomplish.

So much can be fairly said for what might be termed the domestic side of gas supply. What, however, is not so well defined is the future policy of administration, if there is to be (1) inter-communication of supply between different gas-works; (2) amalgamation of undertakings; (3) purchase of surplus gas from coke ovens and from low-temperature distillation plants. The Board of Trade has made it clear that action of some kind is required. The Board of Trade, as is known, appointed an Area Gas Supply Committee to carry out investigation work in one of the intense industrial areas of England. The duty of the Committee is to ascertain the technical and economical aspects of an area gas supply system. Of great importance also is the problem of administration—municipal, company, or gas commissioners with an overriding control.

Sir Alexander Walker, a member of the National Fuel and Power Committee, has given very clear indication that an attempt is to be made on lines of the national electricity supply to provide for the widespread distribution of gas from municipal, company, and private gas undertakings, and from the coke ovens. He has been intimately connected with electricity schemes, and he sees potential national value in gas schemes. He feels that while electricity has its place, gas also has its place in the national life, and especially in the development of heating. He has no doubt that gas will hold its own as regards thermal efficiency.

The suggestion has been given a place in proposals made for a co-operative scheme that gas is like electricity as a public utility, and that its production and distribution can be carried out on similar lines. An analytical survey of the situation as between electricity and gas leads to this idea being largely dispelled. The characteristics of the two forms of energy are different, as regards both generation and distribution. The small electricity generating station is uneconomical as regards fuel efficiency. The latest official returns of fuel consumption



THE PRESIDENT.

J. W. Napier, of Alloa.

Mr. Napier received his early training under his father, Mr. Andrew Napier, at the Crieff Gas-Works. He was a student, at the Heriot Watt College, Edinburgh, of chemistry and engineering, and entered the shale oil industry; his first appointment being with the Clippens Oil Company at Loanhead. Afterwards he took up a position at Young's Oil Works, Addiewell. His first gas managership was at Auchterarder (1896-99); and from there he went to Carnoustie (1899-1902). He was appointed to Alloa, in succession to Mr. Alex. Yuill, in 1902. He was Chairman of an Informal Meeting of Gas Managers in 1906, and Convener of Informal Meetings from 1912-20. He delivered his Presidential Address to the Waverley Association of Gas Managers in 1912. Mr. Napier originated the Scottish Gas Council—a forerunner of the National Gas Council—and he holds the position of Secretary of the Scottish Management Committee of the National Gas Council and of the Federation of Gas Employers, being also Secretary of the Scottish Tar Board and Hon. Secretary of the British Commercial Gas Association (Scotland). He is a Fellow of the Chemical Society, a Member of the Society of Chemical Industry, a Member of the Institution of Chemical Engineers, and a Fellow of the Royal Scottish Society of Arts, Edinburgh. He has contributed a number of papers to Gas Associations and articles to technical journals, and has been largely engaged in arbitration cases for transfer of gas-works to municipalities and in investigations into schemes of gas supply in Scotland.

for the generation of electricity show comparative figures as regards the size of station and output of units as follows: Stations generating 1 million units per annum require 7·05 lbs. per unit; stations from 50 million to 100 million units per annum 2·10 lbs. per unit. With a modern carbonizing plant in a small gas-works, consumption of coal for an equivalent of gas is as efficient as in the case of a large undertaking. Accordingly, it is of some importance in the study of the problem of efficiencies as between small and large gas-works, having in view bulk supply from the large works to the small works, to observe that production costs are not necessarily in favour of the large works. That this is the case is due to the fact that a single unit of carbonizing plant is completely efficient, with the advantage of gasholder storage compared in the case of electricity with battery storage.

The subject-matter of my address will deal largely with the gas supply of Scotland in a broad general aspect in light of the evidence of a rapidly changing policy as regards public utilities, their administration and management—to indicate what may be considered an up-to-date policy of manufacture, distribution, and sale of gas, on combined administrative lines, with regard only to the gas supply of the country as a whole. I do not intend to discuss manufacturing processes, or means of distribution, or the uses of gas, but simply the policy of the industry for the good of the industry, its permanent success in domestic and industrial services. It is felt that the whole atmosphere is already charged with impending changes, and it may be said that the administrative practice of gas supply of more recent years, and, indeed, of yesterday, is largely traditional.

ADMINISTRATION.

May I venture at this stage to state with wholehearted emphasis that, while the practice of the manufacture and sale of gas is technical and commercial, and must for good reason continue under the control of men of the profession, gas government should not be allowed to escape into the hands of political government; and I go further and say that government by Town Council or County Council should not be allowed to dominate as it does so largely at present the gas supply of Scotland. Town Council control of gas supply in Scotland, looking back over the years, has accomplished much good work. In view of future policy it is surely no longer necessary for local authority control, and the protection of the interests of ratepayers. This idea possesses a largely oversubscribed value, and Scotland has been guilty of a gross over-estimate in value of this state of affairs. No technical and commercial business of to-day can afford to be controlled by a constantly changing personnel such as municipal gas committees. One does not suggest that the industries of steel and of shipping, for example, should be controlled by similar methods as in the case of burghal management. The idea is fantastic. What is done is to have the best minds, progressive and experienced men of finance, statesmen of business, having control. The way of things as it has been in the past has proved fairly satisfactory, but it is borne in upon me that the future of gas as one of the stable industries of the country should no longer be under control of the popular choice of an electorate of people. I find it necessary to postulate my own desires of mind, not with reference to the experience of the past—for records and past experience very quickly become lost values—but with entire regard to the future of a highly important industry valuable to our country. Let us see how Scotland stands in municipal gas administration. An analysis of the ownership of gas undertakings England and Scotland shows on the basis of gas output the following to be the position:

—	Scotland.	England.
	P.Ct.	P.Ct.
Local authorities	86·04	30·56
Companies	13·96	69·44

It is not without interest to look at the position of public utilities, gas and electricity, in America and Canada. In these countries the output of gas under municipal control is only 1·5 p.ct. of the total, and of electricity 4·7 p.ct. The evidence is clear that private enterprise and private ownership are considered essential for successful industrial development. The comparison is hardly a fair one, because of political influences imported into industry; but the difference of ownership of public utilities is not altogether without interest.

The business of gas supply is a monopoly. It has competitors, but nevertheless as regards its own duty of service it is a monopoly. A business that is a monopoly stands the best chance to be economically carried on; the reason being that duplication of plant, and therefore duplication of investment, are prevented. This result, however, will not be realized so long as public utilities as a commercial business are to be run by municipalities. Even Government Departments having a controlling voice in capital expenditure for public utilities have been known to exhibit ineptitude, and thereby foolish encouragement to extravagant expenditure on public utilities. Three instances come to mind. There was the case within recent years of the proposed amalgamation of the burghs of Gourock and Port-Glasgow with Greenock. The Port-Glasgow Town Council put down a complete new gas-works, creating a capital debt of £106,000, when in simple fact the municipality of Greenock, with its well managed gas-works a few hundred yards away, and having a low gas rate, could supply with a minimum of capital cost all the gas required. Municipal, and possibly commercial, distrust was the root cause, and the burden on the Port-Glasgow Gas-Works is shown to-day with high interest and sinking fund payments. In addition, there is the further direct loss resulting from the loss of increased output of gas to Greenock.

If we look at a few of the bare facts, the case is one of extraordinary example of municipal *plus* parliamentary decision opposed to technical and economic commercial policy. The data relate to the year 1925-26, when the proposals were under consideration. The output of gas at Greenock was 614 million c.ft., the loan debt £111,771, being £188 per million c.ft. gas sold; price of gas 2s. 5·81d. (average); interest charges 6·5d. per 1000 c.ft. The following is a statement of comparison:

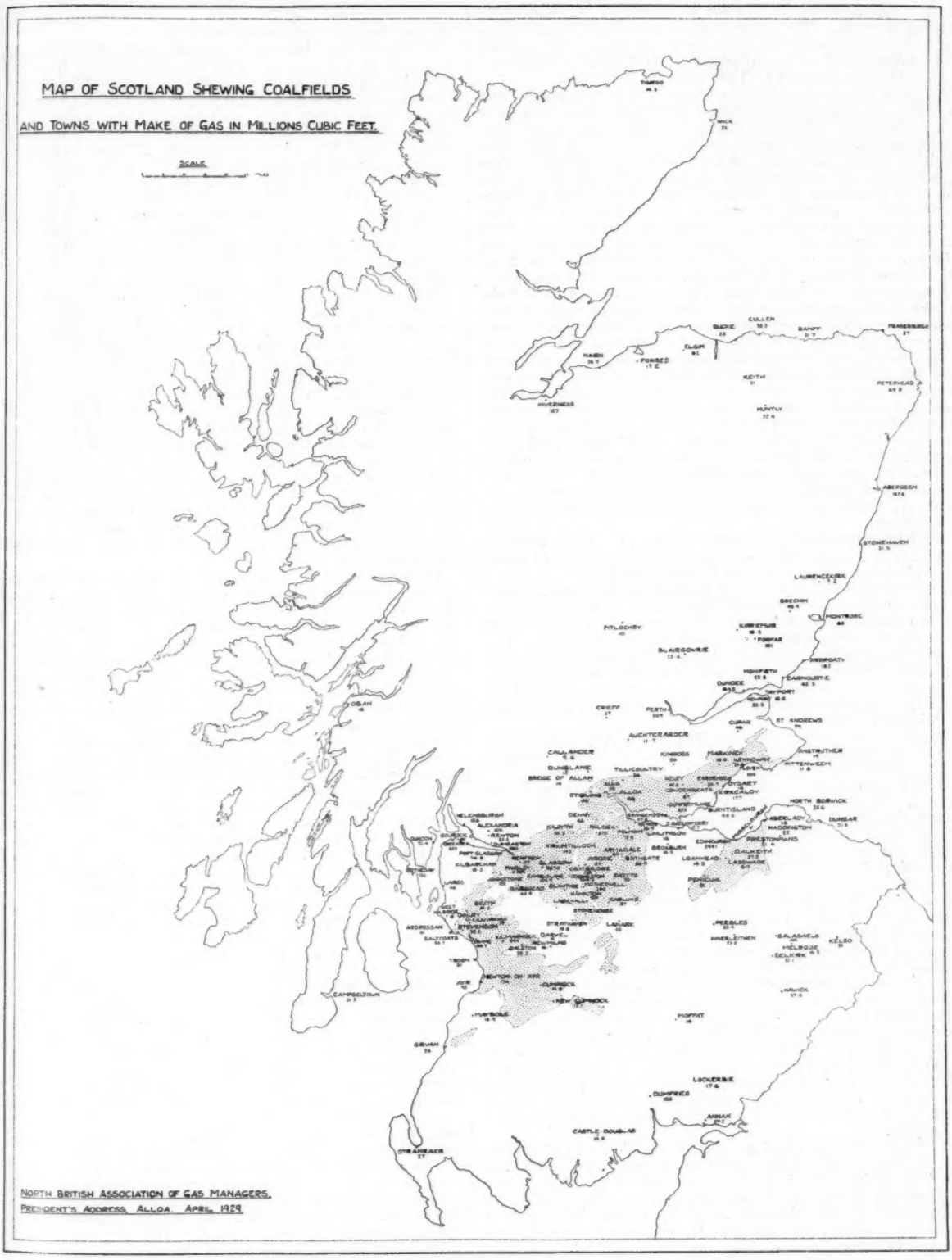
—	Gourock.	Port-Glasgow	Greenock.
Loan debt	£51,757	£106,542	£111,771
Loan debt per million c.ft. . . .	797	1,535	188
Interest and sinking fund charges per million c.ft.	1s. 6·88d.	2s. 10·35d.	0s. 6·25d.
Gas accounted for, million c.ft. .	71	73	614
Price charged for gas	4s. 4·06d.	5s. 11·8d.	2s. 5·81d.

The proposal of the Greenock Corporation was to supply gas in the neighbouring burghs at the same rate as to consumers in Greenock. The annual saving to the gas-consuming public in Port-Glasgow was estimated at almost £10,000, and in the case of Gourock about £4000. The three burghs are co-terminous and continuous, and reach out in one continuous line a total distance of about nine miles. The district is an ideal one for the purposes of a centralized gas supply. The Greenock gas undertaking was capable of supplying the needs of all three burghs; the only capital expenditure of any extent being for extension of existing high-pressure gas mains to the smaller burghs. This particular case I have no fear in citing, and neither the Scottish Office nor the Board of Trade made any attempt to settle the confusion and so prevent the mischief of waste of capital.

A striking example is before me of an enterprising municipality in central Scotland determined to add to its administrative possessions the business of gas manufacture and sale of gas carried on by a private company composed almost entirely of local shareholders, but long existing, having a small capital and a gas rate below the average. The principle working in the minds of the Town Council was the simple and alluring one that the supply of gas was a public utility, and that in the interests of the community the ratepayers, as consumers of gas, should somehow or other be protected, and that no longer would large dividends to shareholders be paid. The evidences of this case of municipal ownership are on record over a period of fifteen years—a sufficiently long time to justify, or otherwise, the purchase of the gas-works of about 20 million c.ft. output. The capital of the company-managed undertaking was about £11,000, while that of the municipality, when acquired by compulsory purchase, immediately came within reach of £30,000. No comment is required beyond stating that the transaction was economically unsound, and the result a serious burden on the community. The area is struggling with a price of gas of about 9s. per 1000 c.ft., *plus* a gas contingent rate; and now electric competition has come. Further, within three miles a successful Gas Company is operating with a price of gas at half the rate.

Gas legislation in Scotland to-day is a dead letter as regards the compulsory amalgamation of gas-works, having in view the existing powers for borrowing possessed by town councils. Under the Burghs Gas Supply (Scotland) Act, 1876, a local authority in Scotland might borrow money at any time and to any amount on their own initiative, and for their own particular undertaking, without any regard being had to a bulk supply which it might be possible to obtain from another works. In respect of the existing power for borrowing possessed by town councils, it might be considered unfortunate that, before the money was spent on their local needs, a special inquiry was not made by the Board of Trade or the Scottish Office. A particular recent instance where a town council decided to spend £10,000 on vertical retorts—this with the acquiescence of the Scottish Office, and, strangely enough, with the help and enticement of an unemployment grant whereby payment of interest was made by the Government on a portion of the capital expenditure. This expenditure was actually incurred, notwithstanding that another municipality having a large gas-works and supplying gas at a low rate made a most attractive offer of a supply to the smaller municipality. This offer would have entailed a comparatively small capital expenditure, and, in addition, a much reduced price of gas. Such an aspect of local administration, having in view the use of gas as a matter of national importance, is to be deplored, and evidences the need for amendment whereby parochial interests should not over-ride national interests.

The proof, therefore, is not wanting that the policy of gas enterprise in the country must not be by compulsory acquisition


MAP OF SCOTLAND SHEWING COALFIELDS
AND TOWNS WITH MAKE OF GAS IN MILLIONS CUBIC FEET.
SCALE.
NORTH BRITISH ASSOCIATION OF GAS MANAGERS.
PRESIDENT'S ADDRESS, ALLOA. APRIL 1929.

of gas-works. There will be, of course, a few cases with characteristics that might be all for the good for compulsory purchase. In my view the transfer of gas-works to municipalities in Scotland has come to an end. I mean by this where the transfer simply results in a change of ownership—this and nothing more. Cases there are where the relatively small undertakings are situated close to a large municipality, and where purchase would be justified, the economies of large output conferring advantages on the small gas-consuming area.

Co-ordination of Gas Supply.

It has to be kept in view that what has been stated has reference to Scotland. We are aware that the present time is witnessing big changes—in the powers of local authorities, the transfer of functions to one central council, and a broadening of the area of administration, and the total elimination of the small area. Where communal services are concerned, the tendency undoubtedly is to co-ordinate and reduce the number of bodies of control. Gas supply is a communal service, and it is capable of functioning over large areas. If the long view is taken, it should not be identified as belonging to any one large or one small circle of interests, fixed by burgh or county boundaries. Accordingly, identity of gas authority, company or corporation, will lose itself to the extent that each undertaking will become a working unit of a scheduled area of gas interests having one administrative board of control. It can be taken as a certainty that as regards Scottish gas supply interests an amalgamation of the gas supply of the country into an appro-

priate number of large combines will be attempted, and, there is good reason to believe, will become a definite policy in process of time. How it is to be accomplished is a fascinating problem. It can be brought about so as not necessarily to be injurious to existing interests. The question at the outset is by what directing power is co-ordination of supply to be advised and brought into economic and successful practice. Is it to be accomplished from within the industry? The answer is yes and no.

To get a true perspective of the situation of gas supply, and in order to realize certain inherent difficulties, let us look at a map of Scotland. First, the number and size of gas-works comprising present-day gas supply, also the geographical disposition of cities, towns, and scattered areas of lesser population: Out of a total of 237 undertakings, no fewer than 185 have a gas output of 50 million c.ft. per annum and under; only 19 works manufacture a quantity between 50 and 100 million c.ft.; between 100 and 200 million c.ft. output, the number is 20; from 200 to 500 million c.ft., the number is only 7; from 500 to 700 million c.ft. there are only 2 works; what remain are the large cities—namely, Glasgow, Edinburgh, Aberdeen, and Dundee.

A more intimate examination of the general situation and the powers and responsibilities of gas undertakings as separate units under the existing regime will help to clarify matters and enable one to set up a more or less satisfactory standard of policy having in view an ultimate co-ordinated gas supply in Scotland. The existing undertakings are divided into three groups—viz., municipal, statutory company, and private company. The municipal and statutory company undertakings can very well be classed together, for the reason that they exist and carry on under parliamentary powers, having certain rights and privileges; the one main difference being that of scheduled areas restricting the gas supply of the statutory company. The private company undertaking, as will be referred to later, while non-statutory, will be found to possess considerable rights which are well secured.

Municipal undertakings number in all 72. Their areas of supply, it is usually assumed, coincide with the area of municipal administration. The area of municipal gas distribution is not always determined by burgh boundaries, as a town council is not prohibited, but is, indeed, encouraged, to supply gas outside its own municipal district—this, however, with qualifications where gas supply concerns are already operating. This is specially provided for by the Burghs Gas Supply (Scotland) Act, 1876. There is the difference, of course, that the outside areas do not accept responsibility for the financial debt of the municipal gas undertaking, which alone rests on the security of the burgh rates.

There is also, under the Gas Regulation Act, 1920, power granted by Special Orders by the Board of Trade, whereby amalgamation of gas undertakings can be made possible.

If the position of a municipalized gas undertaking is examined, is there any cogent reason why its gas manufacturing station should not be made to serve the needs of gas supply to one or many municipalities having gas-works already established, and such other municipal gas-works within economic distributing distance? There should be no doubt whatever on this point; and it may safely be assumed that there is no practical or financial hindrance in areas where such proposals are sound and economic. The capital debt of municipal gas undertakings is redeemed through the agency of the sinking fund. Payments to sinking fund and interest as capital charges are assessed for in the price of gas. Each gas municipality under present accepted parliamentary power must meet its own financial payments in respect of the capital charges referred to.

Procedure for co-ordinating municipal gas supplies—and at the moment cases of municipalities only are being considered—is not intended to wipe out the control of gas supply in the burgh receiving the supply of gas in bulk. If this was done it might destroy local influences and local interests in promoting uses of gas. It will be well that the identity of interest of each authority should not be lost as regards the communal need of gas supply.

A co-operative municipal gas supply would result, of course, in a certain number of gas-works being shut down. But why not, if municipal duty is to be for the good of the community? Any seeking after mere self-preservation as a recognition and memento of personal identity would be a gross indulgence of municipal freedom, and a laughable commentary on municipal commercial management. The answer is difficult when the question is put, Why should Greenock not supply gas to Gourock and Port-Glasgow? Surely public utility undertakings are sadly misnamed when one discovers three gas-works next door neighbours and each spending capital on identically similar plant and machinery.

But it is not suggested that in cases where a municipal gas-works is shut down the Town Council concerned should lose its statutory obligation of gas supply. They would be in the position of distributors of gas, maintaining their full control in matters of price of gas and condition of supply. Main pipes, meters, and all apparatus relating to their own local requirements of gas supply would remain, and they would continue to expend their own capital for their own needs. The capital debt of their own undertaking—now only a distributing undertaking—would continue, and sinking fund and interest charges would be met from the gas rates as usual. This is not an unreasonable proposal for town councils to accept. The circumstances of municipal control should not be a permanent institution where industrial economy is required, and where coal consumption is concerned. The economic uses of coal are national, and the gas industry is a national industry.

As regards the statutory companies, only four in number in Scotland, they should be in no different position from that of municipal gas authorities. What is practicable in the co-ordination or linking up of gas supply areas through municipalities is in the same way practicable with statutory company undertakings. The same authority in the general interests can be exercised. The statutory company, if found expedient and economic, should be called upon to give a bulk supply of gas to corporations owning gas-works. In the reverse manner, corporations, if the circumstances are found necessary, should give supply to the statutory company concerned. As in the case of municipalities, the statutory company would not lose its identity; it would remain precisely as before, except that it would become a distributor of gas only. It may be that in both cases, and in whatever order the supply is given or taken, only partial requirements of gas are necessary; the fundamental point to observe being that, if the geographical area is attractive, and the distance factor of cost of service is not prohibitive in capital outlay, there would result an absence of duplicated capital expenditure in manufacturing plant. It is not required to state other economies, as they are obvious. The broad general policy is what is now under observation. The statutory company would maintain its sliding-scale price of gas, and dividends as before. But, of course, before it could be asked to suspend its duty of manufacturing gas, any proposal of bulk supply, partial or complete, would of necessity require to be made attractive, and on business lines, having in view its capital commitments to shareholders. But this line of policy is made clear when a bulk supply of gas from (say) coke ovens is offered at an attractive price. No municipality or statutory company would conceivably refuse a supply; and reference will be made later to this phase of the subject.

In the cases of non-statutory undertakings, the same policy of co-ordinated interests of economic bulk supply is possible. The non-statutory gas-works number 166, and include the larger number of the smaller undertakings. Here again identity of the individual company need not be lost. There will be cases where, owing to the condition of plant and need for fresh capital expenditure and near proximity, absorption by purchase can be effected with advantage. It is suggested that shareholders of small gas companies, in order not to lose their good investments in gas supply, can by arrangement continue as partners in the amalgamated companies concerned. What is to be avoided in a general scheme of economic linking up with co-ordination of supply is that there should be no capital debt incurred through the purchase of goodwill, which does not represent tangible assets. There must be instances where favourable purchase would be possible, and costs of administration and management reduced. It will be extraordinarily difficult to break down the self interest of the individual undertaking in seeking to maintain the *status quo*. To those of us who are familiar with local interests of gas supply, the barrier is a formidable one.

For many reasons, and without argument, it will be agreed that, if the conception of a correlated gas supply for the country is to be brought about, it is perfectly evident that a presiding agency in the form of Board of Trade instruction will be necessary to compel investigation in order to determine practical schemes. A scheme of economic gas supply does not mean centralization of manufacturing stations of great capacity in the same manner as electricity super stations. That can never be the intention, at least as far as one's vision can at the moment contemplate the future. Capital investment is already sunk in manufacturing plant, and there are a large number of gas-works of moderate capacity showing working results equal to, and in some cases better than, the works having a huge output. Gas supply is not a new industry, and science and engineering—and, let it be added, commercial knowledge—have combined to establish single unit gas stations as highly economic.

The substance of what has been stated has been set forth with the intention of suggesting to the government of gas undertakings themselves the need for inquiry—not merely simple inquiry, but investigation and collaboration by individual undertakings forming a likely group. The fear of compulsory acquisition and reduced value of investment should not exist. Technical and commercial experience in gas-works management is a sufficient guarantee that no extravagant scheme will be considered. There are diverse circumstances and characteristics attaching to each case. The industry is of sufficient strength and future potential value to be able to consolidate. Likely propositions must occur to anyone looking at the geographical situation of towns. There is justification for a combine of gas-works; and I venture to believe that a suggestion of this kind going forth from this meeting may lead to fresh thought on the subject, and some united endeavour being begun. Undoubtedly the unit system of the business of gas supply as the industry is at present maintained has shown a conservative policy. We are a highly scientific and technical industry, and we have progressed in wonderful manner. Other industries have found it necessary to co-ordinate their interests and combine. But we are first and last a great national commercial

business; and before it is too late, and before Government has been forced to grip the situation—and public utility service is attractive to Governments—we do want to pool our individual resources and unify the gas supply of the country where such is possible. We do not seek for legislation, and we do not want the Government organization and control which has been effected for the electricity industry.

Looking backward, and with the view before one of the conception of unification of gas supply in selected areas as being an up-to-date policy and arrived at by co-operative movement from within on the part of company undertakings, one is naturally interested in the gas undertakings of the Middle Ward of Lanarkshire. The scheme was put into being fifteen years ago in an area where twelve gas companies were operating. The policy was one of centralization, and the result has been to close down a number of works, leaving only two to operate as manufacturing centres. A system of high-pressure intercommunicating mains has been laid down connecting up the various towns; the gasholders at the abandoned works being utilized. The scheme has proved successful; reduction of working expenses, and reduced rates for gas have resulted. The scheme is one of County Council administration. Mr. W. E. Whyte in his able and lucid paper on the subject of "Linking up of Gas Undertakings in Scotland" placed before this Association at the Spring Meeting of 1926 (see "JOURNAL" for April 7, 1926, p. 30) was able to describe the scheme as a complete success. Mr. Whyte indicated that, short of the local authority concerns taking up the project, there would have been difficulty in securing any scheme of amalgamation where Companies only were concerned. What was true in 1914 is largely true in 1929. But the particular aspect of the case of the Lanarkshire scheme of gas combine as it appeals to the author with present-day views on the subject is the financial one as regards capital purchase price of the undertakings belonging to the twelve gas companies. In the completed scheme—and Mr. Whyte will be in agreement on this point—there exists, arising out of local authority purchase, a considerably inflated capital debt because of goodwill value having to be paid to the companies whose interests were bought out. The amount does not represent tangible assets. It represents goodwill; and it is quite true that goodwill has a market value which requires to be paid for. But if we visualize the Lanarkshire scheme to have been conceived and carried out on practical lines, as it has been done—centralization of supply and interconnecting high-pressure mains—not through the agency of local authority rule, but by co-ordination of the twelve undertakings as they existed, with one executive representative board, one is bound to conclude that in some measure a reduced capitalized gas combine would exist to-day. This view is stated not in criticism, but simply as a standard lesson for present-day and future consideration. It must therefore be borne in upon one very strongly that machinery which does not at present exist is called for if co-ordination of gas supply is to make a start.

GAS AND COKING INDUSTRIES.

While, so far, consideration has been given to co-ordination of the gas industry within itself, the subject of linking up with the coking industry of necessity demands attention. We are all somewhat familiar with proposals for the gas industry to purchase gas from coke ovens, and with the considerations that are important and necessary for economic supply and security of service. We know of the great developments in Germany in long-distance gas transmission where the large cities are far distant from coalfields and industrial areas. In Scotland the coalfields and industrial areas with large centres of population are bound together. The two industries have much in common treating the same raw material and producing the same bye-products. The need for co-operation is desirable; and it can be said with unanimity that considerations of supply being all in order, gas-works are prepared to purchase the surplus gas. The sale of gas is of common interest to both industries.

As the result of inquiry made into the position of the supply of gas from coke ovens in Scotland suitable for distributing to consumers, it is definitely clear that at the present time the quantity is very small relatively. There are not more than six coke oven installations having a substantial daily throughput of coal. In every case they are placed at coal pits, and, being in the industrial area, they are favourably situated for the absorption of surplus gas by gas undertakings within easy distance. It will be disappointing to learn that of the six large installations of coke ovens, one installation only is equipped with efficient coking plant permitting of surplus gas being available to gas-works. Five of the plants do not have any surplus gas for sale to gas undertakings except in small amount only, such as would not be worth while distributing. Again, the small volume available, having regard to the type of coking plant, would be found to be of such varying quality as to prove unsatisfactory for supply to gas undertakings. Practically all the gas produced in the five works referred to is used in the heating of the ovens. The ovens are non-regenerative or semi-regenerative.

Fifty to 60 p.ct. of the gas produced in a coke oven of efficient design is surplus. The use of producer gas to heat the ovens would about double the quantity of surplus gas. At the present time only one coke oven installation is capable of supplying gas for town use—viz., at the Auchengeich Colliery of Messrs. James Nimmo & Co., Ltd. The gas is supplied to the Glasgow Corporation. The daily quantity is likely to reach about 3 million c.ft. (about 800 million c.ft. per annum). The situation in Scotland at the present time, therefore, is that practically all surplus gas from coke ovens is being distributed for sale to the gas-consuming public. The gas industry desires to impress on the coke oven industry the need for economic co-operation. Gas undertakings must remain the sole distributors to the public of gas as fuel; and they will welcome supplies of gas in bulk from other industries if in any degree the efficiency and price to the public can be bettered. The one important aim of gas-works to-day is to supply fuel to industry in the form of gas. This is the line of progress now being searched after. Low rates must be offered in order to meet the competition of oil and solid fuel.

GAS-WORKS AND LOW-TEMPERATURE CARBONIZATION.

The non-technical public Press has had much to say about low-temperature carbonization, and the production of an easily ignitable smokeless fuel for domestic use. There has been much confusion in the public mind regarding the position of gas-works, and the adoption by them of plant for smokeless fuel production. Recent newspaper correspondence puts the question, "Would it not have been better for the gas industry to take a hand in finding the road to a better smokeless fuel, rather than to have left the inventor in the hands of the company promoter?" The gas industry is fully alive to the need for supplying a smokeless domestic fuel. In recent years more attention has been given to the production of a better class coke from gas-works. More attention is now given to a better selection of coals, especially as regards ash content—the coke to contain a minimum of moisture and to be graded in size. Coke from vertical retorts is an ideal fuel for household use and central heating where closed stoves and hot water boilers are in use. It is also ideal for a large variety of industrial purposes.

It is true that the ordinary gas-works coke produced at high temperatures cannot hope to meet the needs of home fires. It is essential that an easily ignitable fuel should be supplied from gas-works. For a long time, low-temperature processes did not attract gas-works' interests for the reason that the commercial result was a disadvantage. At the present time large-scale low-temperature plants are under trial by a number of the larger gas-works.

Important experiments carried out by Mr. J. Roberts at Ramsgate have put the gas industry in a very forward position whereby smokeless fuel can be produced from existing retort plant, with certain exceptions. Mr. Roberts' experiments, as described in the "GAS JOURNAL," demonstrate that, while formerly the view was held that smokeless fuel, to be satisfactory, should contain about 8 p.ct. of volatile matter, it is now proved that 3 to 5 p.ct. of volatile matter only is required. Smokeless fuels of this standard ignite with certainty and burn quite vigorously in the open grate. In answer to the question, "Can free burning coke be made in gas retorts?" the definite assurance given as the result of trials is "that free burning smokeless fuel can be produced under high-temperature conditions in intermittent vertical retorts. The fuel possesses the requisite properties of domestic fuel for use in open grates, being readily kindled, having good combustibility, high radiant efficiency, requiring little attention, and being, of course, smokeless." The process tried out at the Ramsgate Gas-Works is to blend non-coking with coking coal, to reduce the carbonizing period, giving a less yield of gas per ton. The process is not applicable to moving coal inside the retorts, and is suitable only for horizontal retorts, intermittent verticals, and coke ovens.

It can be concluded that the gas industry is prepared to undertake the production of smokeless fuel. We must, however, await the result of experiments now under trial.

The method of carbonization to produce the smokeless fuel may be either high temperature or low temperature. The problem is an economic one. Gas-works are already largely equipped for the end in view. There is an immediate sale for the gas produced. It is clearly desirable that domestic and industrial fuel, whether as gas, coke, or smokeless fuel, should come from a coal carbonization industry already in existence.

COMBINATION WITH TAR DISTILLERS.

I have so far spoken of the linking up of gas supply undertakings in what might be described as co-ordination of external interests. I now propose to refer to commercial interests that are internal to the business of gas manufacture. The matter of combination of gas-works as tar producers with the business of the tar distillers, is a subject which has been engaging the attention of the Management Committee for Scotland of the National Gas Council.

The Arbitration Scheme under which tar and ammoniacal liquor have been sold to distillers on a sliding-scale basis comes to an end very shortly, and the Management Committee have been negotiating with certain important tar distilling companies with a view to adopting an entirely new scheme. Negotiations have now reached a stage which enables me to tell you in outline what the new proposals are; and I may say in passing that they are on similar lines to the co-operative and profit

sharing schemes which have been worked in England with very satisfactory results.

If the scheme is adopted which the Management Committee will be recommending, certain of the important tar distillers in Scotland will group themselves together. A Joint Committee will then be formed consisting of representatives of the gas undertakings and of the distillers, upon which the gas undertakings' representatives will have a majority and the right to nominate the chairman; and this committee will control the management of the tar distillation business. Each gas undertaking which joins the scheme will in the first place be paid a minimum price month by month for the tar delivered to the distillers. At the end of each six monthly period, the distillers' accounts will be made up, and after deducting costs of manufacture and other charges, the profit balance will be divided between the distillers and the gas undertakings in a proportion on a sliding-scale which increases to the advantage of the gas undertakings as the profits are higher.

This scheme is an entirely new departure for the gas industry in Scotland, but it is recommended on the ground that it gives to the gas undertakings a full control not only of the sale of their tar, but of the distillation, manufacture, and sale of tar products. The gas undertakings, through their representatives, will have the whole of the facts and figures of the tar distillation business under their own supervision; and while the rising scale of profits will give an inducement to the distillers to produce the best possible return on the manufacture and sale of tar products, the gas undertakings will likewise benefit at the same time to an even greater extent.

Success can only be achieved for this scheme by the wholehearted co-operation of gas undertakings and distillers, and by a recognition of the fact that the gas industry and the tar distillation industry of Scotland are bound to one another by their own obviously common interests.

In some quarters the modern tendency towards co-operation and combination in industry is looked upon with misgiving; but with the keen competition in world markets which now exists, producers and manufacturers can no longer look for profits by increasing prices. My view is that consumers have nothing to fear from combinations in industry, but on the other hand, are far more likely to benefit thereby. Profits nowadays can only be obtained by reducing costs; and there is no question that savings can be effected and costs can best be reduced by co-operation and combination.

Universities and the Gas Industry.

The importance of the relations between the universities and industry is a growing one. The laboratory of the university is the industrial works of to-day on a small scale. The university-trained mind is in great demand by the leaders of industry. By reason of the knowledge of fundamentals, university learning will more and more play an immense influence and command recognition where formerly it was accepted with only dilatory interest by manufacturers. It has been remarked that one of the most gratifying features of recent years has been the very great increase in the number of university students who went into business. One of the most important things for the welfare of the nation was the welfare of industry, and it was essential that our industries should get their share of the best brains of the country. Principal Sir James Irvine, of St. Andrews University, recently stated that "whereas fifteen or twenty years ago they were highly relieved indeed to find a certain number of their research collaborators being absorbed by industry, they had now reached a stage where industry was a distinct competitor with the University in securing the best of these people. No longer could the University in recruiting its staff count on getting the best of them. He thought the day was not very far distant when the University would be put in a different position. He did not blame industry. It was profitable to the country and to the individual interested." Principal Sir Donald MacAllister, of Glasgow University, in expressing himself on the subject, stated "that experience of Appointment Boards showed that in the Scientific and Engineering Industries Department there was no difficulty in placing men. It had taken a long time for the ordinary industrialist to see that there was an advantage to him in getting a university-trained student even at the age of 21, rather than promoting and training for himself an office boy; but the movement was growing. There were certain industries now that distinctly turned to them for arts students and science students as being those who were capable of being promoted to being officers in the ranks rather than have all the officers rankers."

I would make a strong plea that gas administrations should attract to the industry the university student of 21. In my view it will be a good thing for the gas industry to employ the university graduate, and it will be no disadvantage for him to begin without the generally accepted elementary training in gas-works practice. The value of a fresh mind on a particular industry cannot be over-estimated. It is not mere knowledge that counts, but rather the factor of the power of the individual built up and strengthened by scientific knowledge combined with the inventive faculty.

It now remains for me to express my sincere thanks for the honour this Association has paid me in accepting me as President. If the position has come to me somewhat late in my career, it is, therefore, of the higher value, for the reason, it may be, that it is the compliment my professional brethren desire to pay for my labours and interests in the work of other Institutions of the industry with which I have been intimately associated for many years past.

INSTITUTION OF ENGINEERS-IN-CHARGE.

Twenty-Ninth Annual Dinner.

With a membership of between 500 and 600, the Institution of Engineers-in-Charge secured an attendance of somewhere about 250 at the twenty-ninth annual dinner, which was held last Friday in the Royal Venetian Chamber of the Holborn Restaurant. So large a gathering was a tribute to the efforts of the Hon. Secretary (Captain Alfred E. Penn) and others who were responsible for the arrangements. The President (Mr. H. G. Burford) was in the chair; and the Vice-Chairman was Mr. S. Carter (Chairman of the Institution).

The large number of distinguished guests present included Sir Brodie H. Henderson, K.C.M.G., C.B. (President of the Institution of Civil Engineers), who, in proposing the toast of "The President," remarked that education in this country was acquiring a very high quality, and it was necessary to bring the various examinations into line with those of the universities and colleges. In the case of the Civils, they had an increasingly difficult entrance examination; but however well a man might pass that examination, he could not become an incorporated member until he was able to show that he had had several years' practical experience.

Responding, the President deplored the shortage of skilled men in this country, and suggested a conference of the various institutions on the subject, so that the public might be informed of this difficulty. At the present time men possessing no skill were earning £3 or £4 a week, while those who had had to make the machinery employed might be getting £2 10s. It was an important matter, because the prosperity of this country had been built up by its skilled men. The failure to provide the necessary skilled men to meet the occasion was now causing Britain to lose her grip of the world's trade.

The Need for Vision.

Mr. J. Wardlaw Milne, M.P., to whom was entrusted the toast of "Transport and Industry," said it would be wise of them all, while they were practical, to be theorists, and to look ahead. No one who went thoughtfully through London could contemplate the continuance of conditions which made the lives of those who had to travel to and from the City nothing but a burden and a care. If only they would employ their young people rightly, they could occupy them in a way which would make secure the position of this country as a workshop of the world, if not as "the" workshop of the world. By all means let them be practical, but at the same time they should have vision.

Fuel of the Future.

The response was by Dr. W. R. Ormandy, who said that, though it might be impossible to state at the moment what was going to be the fuel of the future, oil was here, and was going to remain. They would all have in mind the possibilities of converting coal into oil. A great German Company had succeeded in doing this with brown coal; and a great development of the coal industry in this country would come from low-temperature carbonization, which had so far always been up against the difficulty that the main bye-product was a heavy tar which was at the present moment almost a drug on the market. The man who could convert this into a fuel which could be used by motor-cars was going to render England to a very large extent independent of foreign sources. He had reason to believe that this was not so far off as many people thought.

The toast of "Our Guests and Friends" was proposed by Mr. G. A. Hughes (Vice-Chairman of the Institution), and replied to by Mr. J. Roger Preston (President of the Institution of Heating and Ventilating Engineers), who expressed the opinion that it would be an excellent thing if there could be one big organization, with the Institution of Civil Engineers at the head, and all the other societies affiliated.

DESIGN AND OPERATION OF GAS-HEATED FURNACES.

Paper by Dr. C. M. Walter before the Society of Chemical Industry.

The members of the Birmingham and Midland Section of the Society of Chemical Industry received a visit on April 12 last from the Chemical Engineering Group, whose headquarters are in London. A joint meeting and dinner were arranged. In the afternoon a visit was paid to the metal works of Messrs. Henry Wiggin & Co., Ltd., and at the conclusion of the inspection the chemists and engineers partook of tea at the invitation of the Directors.

The joint meeting was held at the Engineers' Club, Birmingham. The Chairman was Mr. W. A. S. Calder (Society of Chemical Industry), and he was supported by Mr. H. Talbot (Chairman of the Chemical Engineering Group), Mr. W. J. A. Butterfield (Chairman of the London Section of the Society of Chemical Industry), and Mr. C. S. Garland (Vice-President of the Institution of Chemical Engineers).

DESIGN AND OPERATION OF GAS-HEATED FURNACES.

By Dr. C. M. Walter, Head of the Industrial Research Department of the Birmingham Gas Department.

The author stated that there is an ever-increasing demand for plant capable of regulation within very fine temperature limits to deal satisfactorily with heat-treatment operations in the engineering trade. Considerable improvements have taken place in recent years, resulting in greatly increased efficiency, and making provision for work to be carried out automatically. In the automobile and kindred trades in which the heat treatment of components is essential, the tendency is further to increase the automaticity of the handling of goods, with the result that in many instances a modern heat-treatment furnace for mass production work may be considered to be nothing less than a hardening machine—a machine which will automatically carry goods to be heat treated through the heating and cooling chambers, and discharge them at the outlet end into suitably arranged boshes where quenching takes place. After this, if necessary, an automatic tempering treatment can be given to the work. With such automatic handling of goods in regard to large quantities of components, the general results are superior to those produced by furnaces and controlled in the ordinary way. He attributed the great advances made in furnace design to a large amount of research work in recent years, and he said that furnace makers are to be congratulated on the results.

Dealing with the recuperator, Dr. Walter pointed out that in some of the more modern designs, heat-resisting alloys such as nickel chrome have been used for flues with considerable advantage, owing to the high thermo-conductivity of this material compared with firebrick. It is very important, he said, that the thermal capacity should bear some relationship to the class of work dealt with by the furnace; and due regard should be paid to the question as to whether the furnace is to be used continuously or intermittently. If a furnace desired for intermittent work has too great a thermal capacity, a considerable amount of time will be lost owing to the longer period necessary to bring the furnace up to a working temperature. Where a furnace is used continuously, high thermal capacity may be employed with advantage, owing to the increased storage of sensible heat in the setting, which has a stabilizing effect on the temperature gradients present in the working chamber, and thereby leads generally to more uniformity of heating of the working chamber itself.

Dr. Walter then followed with a description of furnaces of the muffle and "inflame" type operating on town gas and producer gas. He also discussed the advantages of the "inflame" type for certain heat-treatment operations; thermal efficiency; regeneration and recuperation; the essentials of furnace design with particular reference to lagging of outside walls; treatment of components in neutral and in non-oxidizing atmospheres; heat-balances; and the deciding factors in type of furnace for particular operations.

In his general conclusions, Dr. Walter said that the first essential for the efficient working of any gas furnace is that the combustion shall be as complete as practically possible. Also, it is of the utmost importance that the mixture of the gas and air prior to combustion should be as complete as possible; otherwise the excess of air required to complete the combustion will be increased, with consequent reduction of flame temperature.

Bearing in mind that the maximum flame temperature which is possible from the combustion of any fuel corresponds to the temperature to which the products of combustion would be raised if the whole of the heat evolved was transferred to the products, the results consequent on the dilution of the products with excess air, he said, will be at once apparent. In the case of direct-fired furnaces utilizing solid fuel, the very low figures of efficiency obtained are almost entirely due to the amount of excess air necessary to bring about complete combustion of the fuel. In some cases, this amounts to 300 or 400 p.ct. In order to reduce furnace losses to a minimum, it is most essential that provision be made to enable the air necessary for combustion to be controlled within fine limits.

In regard to other losses, including losses by radiation and convection, these can only be cut down by paying every attention to the lagging of the outside walls, and providing well-fitting doors. As for leakage through ill-fitting doors, the losses from this source may be very much greater than they appear.

For ordinary heat-treatment operations, declared Dr. Walter, town gas will eventually be the fuel.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Annual Meeting.

On the afternoon of April 13 about sixty members of the Association assembled at Messrs. Parker's, St. Mary's Gate, Manchester, when the following paper was read.

HYDRAULIC MAINS—THEORY AND PRACTICE.

By S. L. Wright, of Colne.

Hydraulic main lay-outs vary greatly in design, but they have the common aim of providing a seal on the dip pipes when the retort doors are opened, and an outlet for tar and liquor vapours condensing from the hot crude gases.

For the purpose of this paper it will be sufficient to consider a simple box type of hydraulic main, with gas outlet to the foul main above the liquor level, and a bottom tar outlet to the tar tower, the latter being connected to the foul main by an equilibrium pipe, and having a sealed overflow from an adjustable weir valve.

The author's attention was first drawn to this subject by the liquor from a tar tower overflowing intermittently instead of steadily. Upon investigation it was found that liquor was lodging in the equilibrium pipe at a point where sagging had occurred. This pipe did not run direct from the foul main to the tar tower in a straight line, but followed the line of the hydraulic main for some distance, and then was taken off at right-angles from a cross to the tar tower; and it was at this cross that the liquor had collected.

It will be of interest to consider what conditions prevail when an equilibrium pipe becomes blocked. Suppose that the seal on the dip pipe is ½ in., and that the vacuum on the foul main is 5-tenths, then equilibrium conditions will be set up. If the equilibrium pipe now becomes blocked, the conditions will remain the same provided that the vacuum on the foul main and the tar tower does not alter. But if the vacuum on the foul main should be lessened, liquor will flow from the hydraulic main over the tar tower overflow. This may be brought about by intentional alteration of the retort house governor, or by a sudden rush of gas due to freshly charged retorts or draining of tar towers. If, for example, the foul main vacuum be reduced to 4-tenths, the level of liquor in the hydraulic main will fall 1-tenth to balance the 5-tenths vacuum still on the tar tower. The level of liquor inside the dip pipes remains the same, but the external level is lower; oscillation will more readily unseal the dip pipes; and there will be a further reduction of vacuum in the hydraulic main and a further loss of liquor.

It now depends upon the flexibility of the exhauster as to whether the seal is regained. If there are many tar tower units on the one exhauster, the failure of one in the manner described may not give enough extra gas greatly to affect the exhauster. In that case equilibrium conditions will be set up with the dip pipes unsealed. If, however, the exhauster is flexible enough to speed up and re-establish the vacuum in the foul main, the seal will be regained. In this case the flow of liquor from the tar tower is likely to occur over fairly lengthy intervals.

In the case mentioned, where there was a liquor block in the equilibrium pipe, the intermittent flow occurred at short intervals of about 15 minutes; and it seems probable that this blockage broke down under the difference of pressures when the dip pipes became unsealed, liquor levels being established below

the tar tower overflow level. Upon the tar tower filling up again, the liquor would resume its normal flow; the intermittent flow at short intervals not being accounted for by the former reasoning. It seems probable that the liquor in the equilibrium pipe oscillates with the exhauster pull, admitting maximum vacuum alone to the tar tower; this being sufficient to cause a fresh flush of liquor as the tar tower fills up. This particular tar tower did not syphon if the plug cock on the equilibrium pipe was shut, and this points to the instability of the blockage as being the cause of the irregular flow.

Another case which came to the author's notice was that of an equilibrium pipe which needed regular attention to prevent its being blocked with a thick tarry deposit. The side of the bed on which this equilibrium pipe was situated always seemed to be heavily sealed; and it was this that first led to the discovery of the blocked equilibrium pipe. No syphoning was ever observed, and clearing the pipe did not cure the pressure. When the bench was shut down, a piece of wood was found jammed across the top of the weir valve, causing the seal to be raised from $\frac{3}{4}$ in. to $1\frac{1}{4}$ in.

The normal vacuum on this bench was 6-tenths, and a reduction of vacuum of even 6-tenths would not unseal the dip pipes. The dip pipe on the other side of the bench being normally sealed to $\frac{3}{4}$ in. depth, it is not probable that there would ever be a flush of gas to bring about sufficient reduction of vacuum to unseal the dip pipes.

It is useful at times when beds are shut down to check dip pipe levels, particularly if this can be done while there is still some heat in the beds, so that the levels approximate to working conditions. The dips may conveniently be measured by a long tube sliding on a piece of rod hooked at its lower end. The rod is inserted in the dip pipe, hooked under the lower edge, and the tube carefully slipped down to rest on the hook. The liquor then marks the amount of seal on the tube, which may be withdrawn and the seal measured. It is more convenient still to have the lower portion of the tube notched in $\frac{1}{8}$th of an inch, so that seals may be read at a glance.

When measuring dips in this manner care must be taken that the liquor in the tar tower and hydraulic main is under atmospheric pressure; and the surest way of doing this is to open all gas valves to the foul main and take a plug out of the equilibrium pipe. When due care is exercised in erection, alteration of levels will be mainly due to tilting of the hydraulic main due to unequal expansion of its supports, and this may be corrected by driving in wedges and chocks where required.

A ready indication of how a retort is working may be obtained if the dip pipe caps are drilled and plugged. Wooden plugs are preferable, as they may be easily removed by hand, whereas screwed iron ones tend to bind so tightly that heating is necessary to remove them. The hydraulic main is an important and nicely adjusted piece of apparatus; and attention paid to it will be repaid in freedom from stopped pipes and in better gas yields.

There was a very interesting talk on the subject, in which the following members took part: Messrs. W. Buckley (Manchester); W. L. Heald (Preston); T. Reynolds (Blackpool); W. H. Battersby (Bury); J. Alsop (Bolton); J. Carr (Stretford); H. G. Haynes (Bolton); and H. P. Lupton (Liverpool). Mr. Wright replied to the various questions.

Mr. R. Prince (Heywood) moved, and Mr. J. H. Williams (Crewe) seconded, a vote of thanks to Mr. Wright.

Annual Dinner.

The members then adjourned for dinner; among the guests being Mr. J. Bridge, Secretary of the Manchester District Institution of Gas Engineers, and Mr. C. H. Creasey, H.M. Inspector, Board of Education.

The Hon. Secretary, Mr. J. Alsop, asked the company to stand while Beethoven's Funeral March was played to show respect to the passing of their President, Mr. H. J. Hailstone.

The usual toasts were honoured during the evening.

Presentation to the Hon. Secretary.

The acting President called upon Mr. Buckley to make the presentation to Mr. Alsop of a Salon Decca Gramophone and Globe Wernick Sectional Gramophone Record Unit.

In making the presentation Mr. Buckley said that those who had any experience of a society, whether education or social, knew that the real success was in a very large measure due to the activity of the secretary. The Manchester and District Junior Gas Association had been very fortunate in their secretaries. As the Association grew, so the work of the secretary increased, and he was afraid that few of the members realized the enormous amount of work this entailed.

It had been the practice at the Annual Meeting to propose a vote of thanks to the retiring officers, for services rendered, but their late President suggested that in the case of the present Secretary something more tangible was deserved, and that at this meeting they should make a presentation to Mr. Alsop in recognition of the services he had so ungrudgingly given during the last 10 years. Mr. Alsop must be one of the oldest active members of the Association, having been elected an ordinary member in July, 1903, 5 years after the formation of the Association.

His worth was early recognized, for he was elected a member of the Council in October, 1905, and he took up the office of Secretary in July, 1908. This position he held until April, 1913. In 1916 he retired from the Association, and was away for 3 years. On his return they immediately found him work again, electing him Secretary, which office he had held until the present time. During his terms of office he had served under 15 Presidents, and was, the speaker believed, the only member of the present Joint Council who had a seat on that body when it was first formed. Mr. Alsop carried through the negotiations in connection with the fine series of lectures given at the Victoria University in 1910. It was of interest to note that when he took office in 1908 the membership of the Association was 116 and the subscription 5s. per annum. In the Report for 1928 the membership was 251, so that the membership had more than doubled, an increase of work not realized by the ordinary member. In connection with the Institution's Education Scheme, Mr. Alsop was one of those appointed to represent the Manchester Juniors, and he very willingly undertook the duties of secretary to the Lancashire Education Committee. Only those who had sat on that Committee realized what that meant. Mr. Alsop had been one of the pillars of the Association, and he wished to express to him the appreciation and gratitude of the whole of the members for the efficient and businesslike manner in which he had carried out the duties of the office; and on their behalf he asked Mr. Alsop to accept the token of their regard for him, hoping that he might continue with them for a long time, and when the memento was in his own home that it would remind him of the strenuous time he had had in conection with the Association.

Mr. Franklin Thorp (Manchester) also paid a very high tribute to the services rendered by Mr. Alsop to the Association during the time when he (Mr. Thorp) was President. Mr. Alsop was an old friend of his, and one whom he very much admired; he had done gallant work for the Association, and he was pleased to know that his labours were being recognized.

Mr. Alsop replied to the various remarks, and thanked Mr. Buckley, Mr. Thorp, Mr. Small, and all of the members for their kindness; he also expressed his sincere appreciation of the memento that had been presented to him.

MIDLAND JUNIOR GAS ASSOCIATION.

Visit to the Birmingham Tame and Rea District Drainage Board.

The Midland Junior Gas Association paid a visit to the works of the Birmingham Tame and Rea District Drainage Board on Saturday, April 6. On arrival at the Saltley Works, the party were met by members of the Engineer's Staff, who acted as guides.

First the detritus pit was inspected, into which all the incoming sewers discharge. An electrically operated dredger slowly travels the length of the pit, and lifts out the grit and other heavy matter, transferring it into wagons, from which it is eventually tipped on a reserved area of land. The sewage passes into five large sedimentation tanks, each of 1,100,000 galls. capacity and worked in parallel. The effluent then flows to a secondary sedimentation and balancing tank of $6\frac{3}{4}$ million galls. capacity, and thence by an 8-ft. diameter culvert to the bacteria beds situated at Minworth, a distance of about $3\frac{1}{2}$ miles lower down the valley. The volume of sewage discharging to the Saltley Works is 27 million galls. per day.

The large stormwater tanks were next inspected, and the action of the two sets of overflow weirs situated in the detritus pit was explained. The sludge from all the sedimentation tanks is withdrawn by means of pumps and discharged into special tanks, and undergoes a process of anaerobic fermentation, which completely changes the character of the sludge into an inoffensive form, and renders it suitable for drying-off in the open air, without causing any nuisance, when spread in shallow layers upon ash beds. The quantity of liquid sludge to be dealt with is about 400,000 tons per annum.

During the process of fermentation odourless gases are given off, and in the past these gases (which contain a large proportion of methane) have gone to atmosphere. Now they are collected from the surface of the tank by means of reinforced concrete collectors which float on the sludge, and are utilized to produce power. There are two gas engines for utilizing this gas, one a 3-cylinder vertical engine of 150 B.H.P. and the other a 4-cylinder vertical engine of 400 B.H.P. Each engine is direct coupled to a suitable alternator; and the electrical power produced is used for various purposes throughout the works.

At the conclusion of the visit Mr. F. Caudwell (President) proposed, and Mr. H. C. Wills (Secretary) seconded, a hearty vote of thanks to Mr. H. C. Whitehead, Engineer to the Board, for the opportunity of visiting the works, and to those members of his staff who had acted as guides to the party during the afternoon.

DISPOSAL OF AMMONIA LIQUORS.

By D. W. Parkes, of the Research Department of Robinson Bros., West Bromwich.

Before the Society of Chemical Industry (Birmingham and Midland Section) on Feb. 14.

The author stated that his firm were in the first place confronted with the problem of the purification of a spent liquor derived from coke ovens. This class of liquor, he continued, which also includes most horizontal liquors, contains as its most offensive impurity monohydric phenols, of which phenol itself predominates.

In seeking a solution of this problem, it was realized that any process which aimed simply at the destruction of the phenols must cost money to work, without any hope of financial return. If, however, something saleable could be recovered in the course of purification, then there was a hope that at least a part of the cost of purification would be defrayed, and a possibility that the process as a whole might even show a small profit. For the solution of this problem, there was evolved the " activated carbon " process, by means of which the phenols are not only removed to the extent of over 99 p.ct., but are recovered to the extent of about 50 p.ct. in the form of liquid tar acids.

Incidentally thiocyanates, which are not usually present in these liquors in great quantity, are slightly reduced, and the oxygen absorption figure comes down by about 80-85 p.ct., depending on the thiocyanate content of the liquor. Nearly two years ago, when some account of the original preliminary experimental work was published (J.S.C.I., 1927, 186-193 T), one of the main difficulties was to obtain a satisfactory carbon. Since then a considerable amount of work has been carried out on a British carbon which has proved very successful. At that time, too, work was just being commenced in connection with a new continuous apparatus, a diagram of which was given in the original paper. Many continuous runs have now been completed with this apparatus on all types of liquor; and while satisfactory results were obtained with coke oven and horizontal liquors, with vertical liquors the consumption of carbon was so high that the process became uneconomical. Virgin liquors also could be treated, but they required a slight modification in the normal method.

Mr. Parkes discussed the treatment of coke oven and horizontal liquors by means of activated carbon, and then followed with a description of a further development of the process in connection with vertical and other liquors.

For the removal and recovery of monohydric phenols from coke oven and horizontal retort liquors by means of activated carbon, said the author, the process consists of the following three steps: (1) Acidification and settling; (2) adsorption of the phenols by passage of the liquor through special activated carbon; (3) recovery of the tar acids, and revivification of the carbon by steam distillation. The acidification is carried out by means of carbon dioxide preferably obtained as a waste product.

When carbon dioxide is used, the pH value of the liquor is brought more nearly to the neutral point, but still remains on the alkaline side of neutrality. With mineral acid the pH value is brought just over the neutral point to a certain value between 6 and 7. Both carbon dioxide and mineral acid cause the precipitation of sludge which is mainly organic in nature. From a waste liquor which has been distilled with lime, carbon dioxide also precipitates calcium carbonate. Acidification brings about an appreciable decrease in the oxygen absorption figure; the decrease being very much more marked in the case of a virgin liquor, for which it is desirable to employ a mineral acid.

This is specially the case where the virgin liquor contains much " free " ammonia, for the carbon adsorbs ammonia to some extent, and on distillation both ammonia and phenols are set free. At high temperatures in an alkaline atmosphere the phenols seem particularly subject to decomposition; and recovery is therefore poor. The use of mineral acid considerably improves the recovery of liquid tar acids; and the slight extra cost is more than covered by the increased yield.

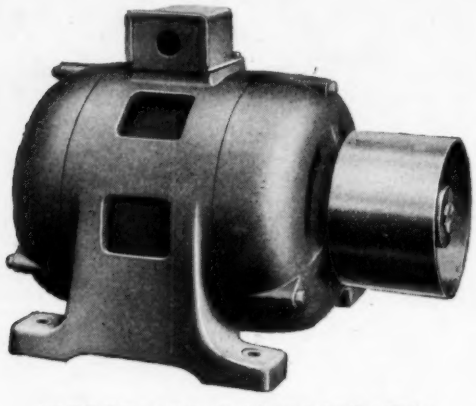
The cost of recovering the catechol is considerably lower than the present price of that substance; and while it is fully realized that the outlet for catechol at its present price is small, the author is of opinion that at a lower price it would find various uses. He explained that his firm's primary object is the purification of ammonia liquors; and in the case of one class of liquors this object has been achieved. Liquors of the other types can also be purified by the same process provided the dihydroxy phenols are first removed. If an extensive outlet for catechol can be found, he concluded, the purification of the latter type of liquor will become not only an economical proposition, but a profitable success.

GAS EXHIBITION AT WOKING.

At the recent Trades Exhibition at Woking the Gas Company adopted the rather unusual procedure of entirely partitioning-off their exhibit. Thus visitors' attention was not distracted by other features. A series of cookery lectures and demonstrations was given each afternoon and evening during the whole of the ten days of the exhibition, and these never failed to draw an appreciative audience. The exhibit was well lighted and tastefully set out. It included a wide selection of gas appliances, many of which were shown fitted and in operation. Conspicuous in the display were Richmond's well-known " Regulo "-controlled " Bungalow New World " cookers and ranges, together with a selection of their popular gas fires, including the " Marlborough." Fletcher Russell's " Kingsway New World " cookers and their " Historic " fires were on view.

STANDARDIZED INDUCTION MOTORS.

A new range of protected squirrel cage induction motors (known as Type K) in sizes from 1 to 25 h.p., 400-440 volts, three-phase, 50 cycles, is manufactured by the British Thomson-Houston Company, Ltd., of Rugby.



"B.T.H." Type K Squirrel Cage Induction Motor.

By production in quantity on highly standardized lines, economies are effected which result in purchasers obtaining machines of improved design at prices lower than would otherwise be possible. Type K motors comply in all respects with B.S.S. 168, have high efficiency and power factor, give maximum starting and overload torque, and take low starting current. Ball and roller bearings are fitted. The rotor has aluminium bars and end rings cast in one piece by a special process, and is practically indestructible under service conditions. The core is ground on the periphery to ensure true running. The stator windings are specially dried and impregnated under vacuum.

THE NORTH STAFFORDSHIRE COALFIELDS.*

Reviewed by M. Barash, M.Sc. (Tech.), A.I.C.

The Fourteenth Report of the Fuel Research Section of the Department of Scientific and Industrial Research dealing with the physical and chemical survey of the national coal resources provides us with a simple account (well illustrated in the frontispiece) of the geology of the North Staffordshire coalfields, its coal seams, and its related seams of ironstone and valuable clays. It is pointed out by Dr. C. H. Lander (Director of Fuel Research), in a prefatory note, that the information has been prepared for use in connection with the survey of the coal seams, which is now in progress in this field. The data have been extracted mainly from cited memoirs of the Geological Survey. This report should prove a valuable introduction to the reports on the analytical examination of the seams of this coalfield, which, we are promised, will be published from time to time as the information becomes available.

The North Staffordshire coalfields lie approximately in the middle of what is called the "Midland Basin," which is supposed to have been at one time a 10,000 square mile practically continuous coal basin, from which there now remains (after earth movements, folds and faults, and denudation) in smaller patches the coalfields of the Midlands, from Lancashire and Yorkshire on the north to Warwickshire and South Staffordshire on the south, including also the North Wales coalfield.

The coalfields under review consist actually of four separate areas, three of which, the Cheadle, the Shaffalong, and the Goldsitch Moss, are small and of no great importance as actual or potential coal-producing areas. The fourth and largest area —the Potteries (or North Staffordshire) coalfield—forms the main subject of this report. Though small in comparison with other British coalfields, it is stated to be exceptionally rich in coal and ironstone, which, with the associated pottery clays, maintain the industries for which the area has long been famous. It covers an area of approximately 100 square miles, and contains some 30 seams over 2 ft. in thickness, giving an aggregate thickness of about 140 ft. of coal. The field is divided into Upper, Middle, and Lower Coalmeasures, of which the Middle Coalmeasures contain all the coals of commercial importance. The coals belong to the bituminous and semi-bituminous classes, and are used for a large variety of purposes; the seams yielding gas, coking, house, and manufacturing and steam coals. Anthracitic types of coal are absent.

A peculiar feature of this group of seams is the difference in coking properties of the coals which are found on the east and west sides of the field. In the east, the seams produce non-coking coals which are used mainly for house and steam-raising purposes; while in the west, gas and coking coals are obtained.

Several of the seams are particularly rich and valuable, and those being worked vary in thickness from 2 to over 15 ft. Among these may be mentioned the Bullhurst Seam, the Seven-Foot Banbury Seam (or Banbury), the Ten Feet Seam, the Rough Seven-Foot (or old Whitfield or Birches) Seam, the Moss (Mossfield, Single Four-Foot, or Four-Foot) Seam, and the Ash (or Rowhurst) Seam.

There are several cannel bands varying in quality and reaching up to 2 ft. in thickness. In the Upper Coalmeasures there is also a band of "Hoo Cannel" from 1½ to 2 ft. thick which has been worked to a limited extent in the west.

* Department of Scientific and Industrial Research. Fuel Research—Physical and Chemical Survey of the National Coal Resources No. 14, "Description of the Coalfields of North Staffordshire." H.M. Stationery Office, Adastral House, Kingsway, W.C. 2. Pp. VI. + 16; price, 1s. net.

ENGINEERS' STOP WATCHES.

A short time ago Messrs. A. Arnold & Co., 17, Elmcroft Avenue, Golders Green, N.W. 11, placed on the market a range of stop watches, adequate to all general engineering requirements and, what is perhaps equally important, at prices well within the means of the most modest purse. The "Fortress" pattern functions both as an ordinary timepiece and also as a stop watch giving accurate readings to within a fifth of a second. It is a 30-hour watch, fitted with lever movement, and is guaranteed for 12 months. In addition to the minute and hour hands, a centre seconds hand is fitted, making one complete revolution per minute over a scale graduated in fifths of a second. The watch can be stopped and started by movement of a small projection on the outer rim. For ordinary everyday service this is just the sort of timepiece the practical working engineer will find most useful. (This watch does not have a fly back action, but another pattern is available with that additional convenience.)

Arnold's "Racing Recorder" is fitted with lever movement, and has minute and second hands only. It has start, stop, and fly-back actions, bringing both hands back to zero, actuated by successive depressions of the winding knob in the ordinary way. This is a sound and reliable stop watch for general timing and testing purposes. Where the utmost exactitude of measurement is required, the "Seconds Chromograph" (with independent fly-back action) is the pattern to employ. This watch has a 15-jewelled lever mechanism of the highest class. In addition to the ordinary hour and minute hands, stop watch minute, seconds, and fifth-seconds hands are provided; these being started, stopped, and reset to zero independently.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

British Tar for British Roads.

Sir,—We notice in your editorial in the issue dated April 10 (p. 79) reference to local authorities and road tar. As far as we can gather, it appears that every time the Minister of Transport is asked a direct question on the use of British material for British roads, a most unsatisfactory answer is received; and the answer that Col. Ashley gave to Mr. T. Kennedy appears to be a stock reply.

It would be interesting to know, apart from Scotland, how many authorities in the British Isles exclude British material from their tender forms. It is beyond the comprehension of most British people why our local authorities will purchase foreign materials—not only bitumen, but road stone—in preference to material of British manufacture, which can be obtained on their own doorstep. We maintain that it should be a condition, when making grants of moneys for the maintenance of roads in the British Isles, that the grants should only be given when British materials are used, and we are of the opinion that the time is now ripe for all interests in the British Isles who are up against foreign competition to combine, and take vigorous steps to get this disgraceful state of affairs remedied. In no other country in the world do you get such a state of affairs as you do in the British Isles to-day—that of British money pouring into foreign countries to finance their manufactures, and these manufactures sent back and used in preference to our own materials. Probably someone in the "know" will be able to enlighten us as to the reason for this state of affairs.

E. Hardman,
Managing Director.

E. Hardman, Son, & Co., Ltd.,
Bedford Street,
Hull, April 12, 1929.

REGISTER OF PATENTS.

Quenching Coke.—No. 307,204.

LYMN, A. H., BOWATER, N. J., and CHAMBER OVENS, LTD., all of Victoria Street, S.W. 1.

No. 5966; Feb. 25, 1928.

This invention aims at providing an improved method of wet quenching coke from intermittent vertical, inclined, or horizontal carbonizing chambers from which large masses of incandescent coke are discharged at one time, which avoids known drawbacks and at the same time enables the advantages of the use of flowing water to be obtained.

The invention comprises, broadly, discharging in bulk into a receiver, which is adapted to take the entire amount discharged, and discharging the incandescent coke from the receiver in a gradual manner and at a regulatable speed, by means of valves or other devices, into a stream of running water, from which the quenched coke may be recovered in any suitable manner. If the water stream is designed to run parallel to the bench, the receiver may be stationary and discharge be effected immediately.

Alternatively, the receiver may be movable so as to discharge the coke into the stream at any convenient point not necessarily in the vicinity of the bench. By this latter method the coke can be caused to remain in the water stream for a fixed period, irrespective of the chamber or oven from which it was discharged, thereby preventing over or under quenching and enabling the water content of the coke to be accurately controlled.

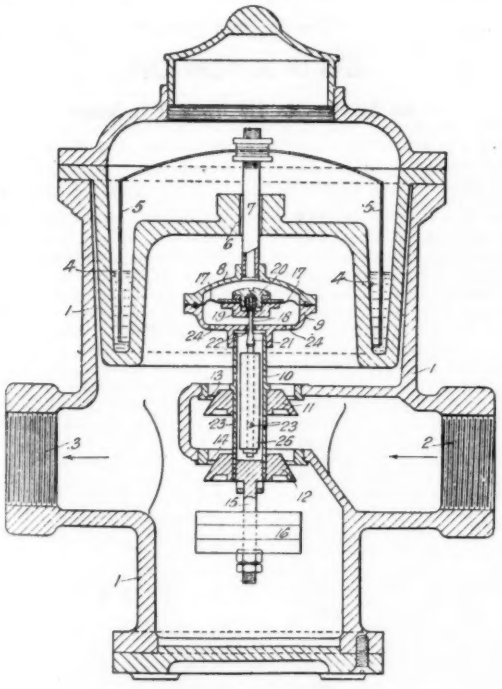
Governors.—No. 307,156.

SOUTH METROPOLITAN GAS COMPANY and CARPENTER, C. C., both of Old Kent Road, S.E. 15.

No. 1214; Jan. 13, 1928.

This invention relates to gas governors of the kind in which a mercury-sealed bell, subjected to the outlet pressure of the gas, is employed to regulate the amount of lift imparted to a main valve or valves and to a small or secondary valve for allowing a sufficient qantity of gas to continue to flow to keep alight pilot jets—for example, when the main valve or valves are closed.

According to the invention the amount of lift imparted to the small or secondary valve or valves is controlled by means independent of the bell for controlling the main valve or valves, and is also subjected to the outlet pressure of the gas.



A South Metropolitan Governor.

In the accompanying sectional elevation, 1 is the main casing, and 2, 3 the gas supply and discharge passages respectively. 4 is an annular trough-shaped compartment in which floats a bell 5 sealed by mercury in compartment 4. The interior of the bell is in communication with the outlet side of the governor through a passage 6 formed in the wall of compartment 4, and the bell is fast with a tube 7 which passes loosely through the passage 6 and is connected to the upper half 8 of a casing, the lower half 9 of which is secured to a second tube 10. Fast with the tube 10 are main valves 11, 12, adapted to co-operate with valve seats 13, 14 to control the main flow of gas from the supply passage 2 to the discharge passage 3; the lower end of the tube 10 having connected thereto a rod 15 on which are detachably mounted weights 16 tending to move the valves 11, 12 to their open positions. 17 is a diaphragm clamped between the halves 8, 9 of the casing, and 18 is a rod mounted in a support 19 clamped by a nut 20 to the centre of the diaphragm, and formed with a valve 21 which co-operates with a valve seating 22 formed in 9. The valve 21 controls the flow of a small quantity of gas from the supply passage 2 to the discharge passage 3 through orifices 23 formed in 10, and orifices 24 formed in 9; the rod 18 being provided with a weight 25 tending to move the valve 21 to its open position.

The pressure areas of the bell 5 and the diaphragm 17, and the forces applied to the bell and the diaphragm by the weights 16 and 25, are such that a smaller pressure rise is sufficient to raise the bell to close the valves 11, 12 than is required to raise the diaphragm to close the valve 21.

In operation, when a normal quantity of gas is being consumed, the valves 11, 12, and 21 are open, the position of the valves 11, 12 for a given gas flow being capable of adjustment by the removable weights 16. When only a small quantity of gas is being consumed, the pressure of the gas on the outlet side of the governor raises the bell, whereby valves 11, 12 are moved on to their seats 13, 14, the rise in pressure being, however, insufficient to close the valve 21. Should no gas be consumed, the further rise in pressure raises the central portion of the diaphragm 17, the upper side of which is, by means of the tube 7, subjected only to atmospheric pressure, whereby the valve 21 is moved into engagement with its seating 22, the supply of gas being thus entirely cut off by the valves 11, 12, and 21.

Low-Temperature Tar Treatment.—No. 307,382.

MORGAN, G. T., and PRATT, D. D., both of Teddington.

No. 32,929; Dec. 6, 1927.

According to this invention, crude low-temperature tar or a distillate therefrom is first treated, preferably at ordinary temperature, with a solvent to precipitate pitch. A fractional distillate boiling up to 150° C. from low-temperature tar is a preferred solvent, but ether or petrol may be used, although the extraction is less complete. The solution is allowed to settle, or is otherwise clarified, and is then treated with an aqueous solution of an alkali metal hydroxide saturated with a neutral salt of an alkali metal. The aqueous solution is separated, and is advantageously agitated with petrol or other suitable solvent to remove any neutral oils. Caustic soda solution of about 10 to 20 p.ct. strength saturated with common salt is the preferred aqueous solution of alkali metal hydroxide.

The aqueous solution of phenols thus obtained, after separation, if necessary, of the petrol or other solvent, is treated in known manner (such as by passing carbon dioxide through it) to liberate the phenols, which may be allowed to settle or may be extracted by a suitable solvent.

The yield of phenols by this process may be expected to be between 10 and 15 p.ct. of the weight of the crude low-temperature tar, which is considerably smaller than the fraction obtainable by previous methods; but the phenolic products are much purer, and even without further purification tend to crystallize. They are preferably further purified and separated into fractions by the use of solvents, such as petrol or carbon tetrachloride.

By another method, the solution of phenols obtained as above described is first treated with lime-water saturated with calcium chloride; the aqueous solution being separated and treated as already described for winning the phenols. The remaining solution of phenols in the solvent added to precipitate pitch is then treated with caustic soda solution saturated with common salt, as already described.

An alternative mode of operating is to extract the low-temperature tar in known manner by caustic alkali solution, to saturate the alkaline extract with common salt, and to filter it through a bed of common salt until it is clear. Or the alkaline extract may be washed with an organic solvent and subsequently saturated with common salt. In either case the clear alkaline solution is treated for winning the phenols in the manner already described. Here also the double treatment, first with solution of alkaline earth hydroxide and then with caustic alkali, may be applied.

The pitch thrown down in the earlier stages of the procedure is a satisfactory binding agent, and can be applied as a dressing for roads either alone or in the form of an emulsion. The pitch can also be worked up either by treatment with solvents or by distillation to yield lubricating and other oils and a harder pitch. The solution from which the phenols have been extracted can be treated in known manner, to yield bases, natural oils, and waxes.

Drying Gases.—No. 307,600.

CHEMICAL ENGINEERING AND WILTON'S PATENT FURNACE COMPANY, LTD., WILTON, T. O., and PARKER, J., all of Victoria Street, S.W. 1.

No. 4248; Feb. 10, 1928.

The drying process of this invention is characterized in that the gas, after having been dried by passing through hygroscopic substances, passes first to traps of a suitable kind adapted to retain the bulk of whatever liquid it may hold in suspension, and then through suitable packings adapted to retain any further suspended liquid and to absorb any traces of deleterious gases, such as sulphurous acid

fumes produced whenever sulphuric acid is used as one of the hygroscopic substances. Among suitable hygroscopic substances is mentioned calcium chloride in liquid form.

According to the invention, the bulk of the water vapour is removed by liquid calcium chloride; this treatment being followed by a treatment with sulphuric acid to dehydrate the gases to a greater degree and to remove partially certain unsaturated compounds which, being gum-forming constituents, it is desirable to eliminate. Means are provided for trapping both calcium chloride and acid leaving the washers, and for reconcentrating either the calcium chloride or sulphuric acid in a known manner.

The gases, after these treatments, are substantially free from water vapour, but may contain traces of corrosive substances in the form of spray, fumes, or gases; and in order to remove these, the gas is passed through a neutral or an alkaline solid or liquid. In addition, it may be necessary, owing to the chemical reaction between the moisture in the gas and calcium chloride or sulphuric acid, to provide cooling apparatus for cooling either the calcium chloride or the sulphuric acid or both; and in the apparatus for carrying out the process according to the invention, the coolers will be provided in the form of coils in the chambers through which the gases are passed.

The use of calcium chloride before the sulphuric acid treatment has, moreover, the advantage that the dilution of the sulphuric acid is much less marked, and it becomes commercially feasible to use the diluted sulphuric acid directly in a plant for the manufacture of sulphate of ammonia, without subjecting it to a concentrating process. The concentration of the calcium chloride, which receives the bulk of the moisture, is a simpler process than the corresponding operation in the case of sulphuric acid.

In plant for carrying out the process, the patentees make use of a known apparatus for treating gases with liquids; there being a succession of washing chambers traversed in succession by the gases. The first one or two or more chambers are for the calcium chloride, and the next is a suitable trap for any calcium chloride in suspension. The second set of chambers is for the sulphuric acid treatment. The gases are then led through a suitable trap filled with pumice stone or the like to arrest any liquid spray carried by the gas, followed by a similar trap containing magnesite or calcite, adapted to prevent sulphurous fumes from passing out with the gases.

MISCELLANEOUS NEWS.

SHAREHOLDERS' DAY AT LUTON GAS-WORKS.

A Tour of the Works.

Thursday, April 11, was shareholders' view day at the works of the Luton Gas Company, and the innovation was much appreciated by about 50 out of 350 shareholders. The Directors in attendance were Mr. F. W. Plummer (Chairman), Mr. J. W. Green, a former Chairman, Mr. G. H. Latchmore, and Mr. R. E. Tomson, with Mr. William Phillips, Engineer and Secretary. The Chairman welcomed the party, who were afterwards divided into groups and taken round by members of the staff. At the completion of the tour tea was provided in one of the messrooms, where had been arranged an interesting display of gas appliances for lighting and heating, old and new.

Mr. W. W. Merchant and Mr. T. G. Hobbs expressed thanks on behalf of the shareholders, and the Chairman replied.

Mr. J. W. Green, one of the octogenarian leaders of local life, said the Company was established 95 years ago with a capital of £2500, and the Company now had a capital of £220,000. "What are we going to be in another 95 years?" he asked. They might then be talking in millions, as he was firmly convinced there was an enormous future for the gas industry, and they need not be frightened by electricity.

Mr. Phillips, replying to an expression of thanks to himself, and through him to the staff and employees, said that some interesting letters had been received from shareholders who knew his father and grandfather, predecessors in his position. There were seven or eight employees with over 35 years' service, a dozen with 34 years' service, and one man who had been with the Company 46 years. The Directors, himself, and their relatives held just a third of the total capital, so that it would be recognized that the Directors' interests were very much the interests of the whole body of shareholders.

WATER-SLIDE GAS FITTINGS.

Second Fatal Accident in Birmingham.

The second explosion occurring recently in Birmingham, arising from a defective water-slide gas fitting, was the subject of an inquest held on Thursday, April 11, by the Coroner, Dr. H. W. Davison. The case referred to the death of Eliza Heritage (85), widow, of Greenhill Road, Moseley, who died in the General Hospital on March 19. The explosion occurred about 9.40 on March 11, and medical evidence showed that on admission to the hospital Mrs. Heritage was suffering from shock and burns to the hands, arms, and face. Death was due to shock and toxic absorption. A verdict of "Accidental death" was recorded; and it was stated that the Birmingham Gas Department are warning gasholders of the danger of fittings of this kind.

Kathleen Edith Wright, Mrs. Heritage's grand-daughter, who lived with her and was also injured in the explosion, said there were chandeliers of the water-slide type in the house, and she was in the habit of filling the slide with water periodically. On March 11, when she returned from business, there was a smell of gas escaping, which she traced to the chandelier in the drawing-room, from which there was a hissing noise. Her grandmother was in a room upstairs with the gas on at the time. Witness said she opened the windows of the drawing-room and afterwards turned the gas off at the meter. The hissing then stopped. At her grandmother's suggestion, as they wanted light, she turned the meter tap on again with the intention of turning the gas off at the main before retiring. Her grandmother told her to put some water into the drawing-room chandelier, so she got the steps, a candle, and water, and went into the room, putting the candle on the table. She admitted it was a dangerous thing to do, having discovered the leak, but she did not stop to think at the time.

Mr. *Marsh*, Fittings Engineer to the Birmingham Gas Department, said that on examining the chandelier he found the slide defective, the pipe having split. The slide would not hold sufficient water to produce a water seal, and the gas would thus escape at a considerable rate into the room.

Replying to the Coroner, Mr. Marsh agreed that he had, unfortunately, to give evidence in a similar case only a few weeks ago [see "Journal" for March 20, p. 818], when he informed the Coroner that there were about a thousand of these water-slide fittings in Birmingham, that they were out of date, and extremely dangerous potentially, and that householders or property holders should remove them, as they constituted a great danger to the people in the house. The Corporation Gas Department, he added, were sending out a circular letter to the occupants of all houses found with such fittings. A systematic canvass was being made, and would be completed by June.

The Coroner, in summing up, pointed out that the Gas Department had no power to prevent the use of defective fittings, but they were doing their best to draw the attention of householders to the dangers of such a fitting.

GAS IN MODERN LIFE.

Its Services to Health and Industry.

Gas, and the unique contribution it is making, and can yet make, to the well-being of humanity, to the efficiency of industry, and to the solution of one of Britain's most fundamental problems, is the theme of an interesting special section in the current number of the "Empire Mail" (212, High Holborn, W.C.1; 1s. 6d. net). The articles are comprehensive and the contributors authoritative.

"Service" is pre-eminently the slogan of the British gas industry. The field of that service is well indicated by the titles of some of the principal articles: "Gas as a Public Service—A Century of Growth and a Future of Promise," by Sir David Milne-Watson, describing the present position of the industry and its aims; "Gas as the Servant of Industry," by Sir Arthur Duckham, whose practical contribution deals separately with the uses of gas in such diverse industries as motor-car manufacturing, printing, shipbuilding, metal and textile industries, and in the food and catering trades; "Gas as the Servant of Hygiene," by Prof. Leonard Hill, than whom there is no more helpful writer on health subjects; and "Social Science and Social Service," by Mrs. M. A. Cloudesley Brereton.

From the standpoint of national economy, there is a notable article by Mr. F. W. Goodenough, whose conclusions on the subject of "Fuel Conservation" should be weighed by statesmen and business men alike. The use and misuse of coal, the value of its bye-products, electricity's possibilities—and limitations—and the spheres in which gas holds the field as the fuel of highest efficiency, are all dealt with at some length.

In "The Bye-Products of the Gas Industry," Mr. W. Gordon Adam deals more fully with the derivatives of coal, while in "Research and Education" Mr. John Terrace shows what large scope is given to such activities in the gas industry. A related contribution comes from the Marquis of Hartington, whose article "The Allied British Gas Industries" shows what has been done by co-operative effort. Finally, there is a gratifying account of "Industrial Relations in the Gas Industry," by Col. S. S. Ogilvie and Mr. Arthur Hayday, M.P.

In another section, of special value to home and overseas gas engineers, the features of British gas plant and appliances are dealt with. Mr. F. J. West discusses "Technical Advances in Gas Production," and on other pages modern British gas plant installations at home and abroad are described. "Refractories for Gas Production and Utilization," by Mr. W. J. Rees, deals with a highly important auxiliary of the gas industry, and emphasizes the high quality of British refractories.

GAS COMPANIES' RESULTS IN 1928.

DEVON GAS ASSOCIATION.

Presenting the Directors' report and statement of accounts at the 23rd Annual Meeting of the Devon Gas Association, Ltd., held at Exeter, the Chairman, Mr. William Cash, said the shareholders would be pleased to note the increased amount of business which the concern, comprising ten gas-works, had transacted during the year. An extra 2 million c.ft. of gas, or an addition of a little more than 4 p.ct., had been sold. The number of consumers had increased by 162, and cooking stoves by nearly 100. There was a profit on the revenue account of £3422, which might be regarded as satisfactory in view of the considerable expenditure on the repairs of works, mains, and the allowance for depreciation. During the year a supply of gas had been taken into the Uplyme area at Lyme Regis, which was rapidly developing. Another important feature was the purchase by the Association of the Cullompton Gas Undertaking, as from Jan. 1. The acquisition was likely to be of value to the Association, though considerable expense would be necessary for re-conditioning and developing purposes. The price of gas had been, on the average, 5d. per 1000 c.ft. less than the previous year, and the future policy would be to keep down expenses so as to make a further reduction in the price, if possible, in the various towns concerned. Referring to the preliminary notice received regarding the assessment of the Association's various works, the Chairman said it was very unfortunate that those advising the rating authorities had found it necessary to raise their assessment to such an extent that they were not at the moment in agreement with the authorities. He was of opinion that the suggested burden was unduly severe. It was a serious matter in the sense that any additional rates could only be dealt with by one procedure—namely, increasing the price of gas, or, in any case, preventing a reduction. There seemed a tendency for local authorities, when assessments were put up, to regard that as a justification for spending more money; and if this took place there would be not only no relief, but an added burden to undertakings whose assessments were raised to an undue extent. A dividend of 7½ p.ct., *less* income-tax, was declared, and the Managing Director, Mr. R. J. Rew, was re-elected.

HAYWARDS HEATH.

A very satisfactory state of affairs was reported to the shareholders of the Haywards Heath District Gas Company at the Annual Meeting held at the offices in Mill Green Road on April 8; Mr. Edward C. Charleton (Chairman of Directors) presiding. The Directors' report stated that the balance to the credit of the profit and loss account was £6490. A dividend was recommended of 6½ p.ct. on the redeemable preference stock for the half-year to Dec. 31, 1928, equal to £650, and a final dividend at the rate of 9½ p.ct. per annum on the 5 p.ct. consolidated stock for the half-year to Dec. 31, 1928, making 8½ p.ct. (*less* income-tax) for the year, equal to £1741, making a total of £2391, and leaving a balance to be carried forward of £4008. During the past year considerable repairs and replacement of plant had been carried out, and a carburetted water gas plant had been installed and brought into use. Moving the adoption of the report, statement of accounts, and balance-sheet, the Chairman said that over 100 million c.ft. of gas was again supplied, and although there was an increase of over 4 million c.ft., the actual figure which was paid by the consumers was less than in 1927, due to the reductions made during that year in the price of gas. There had been a considerable increase in the sale of stoves and hire fittings, due to the increased number of consumers, and the Company had benefited very considerably by the sale of gas appliances through the showroom on the Broadway, which had been very useful to the Company since it was opened a few years back. As regards residual products, the price of coke had universally decreased, which remark might also apply to tar and sulphate of ammonia. There had been, however, a big increase in the sale of tar, amounting to over 15,000 gallons.

HITCHIN.

The Annual Meeting of the Hitchin and District Gas Company was held on March 28 at the Starling's Bridge Office; Mr. F. Ransom occupying the chair. The Directors reported that the lease of the old gas-works at Starling's Bridge, used as a gasholder and distributing station, being near expiration, the Company had acquired the property by purchase from the Trustees of the Hitchin United Charities. The quantity of gas sold during the year was 527,224 therms (105,444,800 c.ft.), and 114 new consumers were supplied during the year. The price of gas was 10d. per therm (4s. 2d. per 1000 c.ft.) for the first part of the year, and 9d. per therm (3s. 9d. per 1000 c.ft.) for the second. An interim dividend of 3¾ p.ct. was paid on the ordinary consolidated stock for the half-year ended June 30, 1928, and the Directors recommended that for the half-year ended Dec. 31, 1928, a final dividend of 3¾ p.ct., *less* income-tax, be paid on the 7½ p.ct. redeemable preference stock (making 7½ p.ct. for the year), and a final dividend of 3¾ p.ct., *less* income-tax, on the ordinary consolidated stock (making 7½ p.ct. for the year). The income from residuals had been considerably reduced during 1928 owing to the lower market values of coke and tar. The accounts showed total receipts of £31,054, including £21,310 sales of gas, £3139 rentals, and £6388 from sale of residual products, and a total expenditure of £26,984, including £20,048 on manufacture of gas, and £3439 on distribution. The Chairman, in proposing the adoption of the report and accounts, said that on the whole these were quite satisfactory, and showed continued progress. Not only was there an increase of 114 consumers and an increased sale of some 6 million c.ft. of gas, but 273 new cookers, 130 fires, 40 wash coppers, 40 geysers, 17 radiators, and 26 gas irons had been supplied during the year. Referring to the purchase of the freehold of the property at Starling's Bridge, he said they were thereby enabled to increase largely the production of gas without having to buy any more land for the purpose, and had made their position more secure than it was before. During the excessively cold weather in January and February, they sent out 3,666,000 c.ft. more gas than in the corresponding period last year.

SUTTON BRIDGE.

It was reported at the 64th Annual Meeting of the shareholders of the Sutton Bridge (Lincolnshire) Gas and Coke Company that increased facilities for purifying which had been provided during the year had effected a considerable saving. A dividend of 5 p.ct., free of tax, was declared, which, with the interim dividend paid last November, made 8 p.ct.

PROGRESS OF THE MIDDLESBROUGH GAS DEPARTMENT.

The Introduction of Coke Oven Gas.

Sir Joseph Calvert, Chairman of the Middlesbrough Gas and Electricity Committee, gave some interesting figures to the Town Council on April 9 showing the development of the Middlesbrough gas undertaking.

Since the introduction of coke oven gas for municipal supplies, in which Middlesbrough were the pioneers in this country, the total saving to the town had been £1,116,136, said Sir Joseph, who pointed out that he was first approached in 1902, shortly after he had become a member of the Committee, by representatives of Messrs. Samuelson, as to the possibility of Middlesbrough using waste gas from coke ovens, as was done in Germany.

GREATER OUTPUT AND CHEAPER GAS.

In 1912 the Committee agreed to a contract with the coke oven owners, and two years later, when the Middlesbrough Council had the distinction of being the first Corporation to get Parliamentary sanction for the purpose of buying gas for municipal distribution, coke oven gas was first harnessed to the town gas supply.

The necessary outlay had been met and discharged out of revenue long since. So good was the gas, and so much cheaper in comparison with the gas they could make, that at the beginning of 1916 the town was completely supplied with coke oven gas. In 1902-3 447,064,500 c.ft. of gas were sold in Middlesbrough, compared with 568,520,300 c.ft. in 1914-15, and 1,044,830,000 c.ft. in 1928-29.

Capital expended was £370,000 in 1902 and £749,000 up to this year. Debts redeemed at March 31, 1915, were £181,169 over 59 years. Up to March 31, 1929, £437,791 had been redeemed over 73 years, and since the introduction of coke oven gas £256,622 had been redeemed in 15 years.

It was a moderate estimate to say that over the past 15 years the consumers of gas in Middlesbrough had paid 6d. per 1000 c.ft. less than they would otherwise have paid, which, on the basis of last year's consumption, was equal to an annual saving of £26,150. The coke oven owners had received roughly £243,536, and would now receive over £30,000 per year.

RATEPAYERS BENEFITED.

In addition to the figures he had just given them were to be set down £176,220 given from gas-works profits to the relief of the rates, the greater part of which it was only fair to say was set aside between 1856 and 1910.

The proposed reduction of 2d. per 1000 c.ft. in the price of gas and the 5 p.ct. off the electricity price would be as good as a reduction of 6d. in the £ off the rates. It was better for the ratepayer to have a reduction in the price of his gas and electricity, because he got the saving straight away.

Paying tribute to the Gas Manager's part in this development, Sir Joseph said Mr. Blincoe was not only a capable engineer, but a chemist as well.

The Council sanctioned the purchase of an up-to-date purifying plant for the gas-works capable of dealing with 8 million c.ft. a day.

Belfast Extend their Gas Supply.—The Belfast Gas Department are extending their supplies outside the city boundary to Church Quarter, Dundonald. This will involve the substitution of a 6-in. main by a 12-in. main, at a cost of £1350, for a stretch inside the city boundary, and the laying of a 6-in. main from the city boundary at a cost of £1800. The charge to consumers in the new area of supply will be 4s. 9½d. per 1000 c.ft., *less* 20 p.ct. discount within one month.

Bakewell Gas Undertaking.—During a discussion on the estimates at the Bakewell (Derbyshire) Council meeting, it was stated that the Gas Committee had now in hand a scheme for the improvement of the public lighting of the town, and this necessitated an increase of £168 in the expenditure of the gas undertaking in the coming year. Mr. P. Wood mentioned that the Gas Committee were now considering a scheme for the erection of new gas-works at a cost of £14,000, but they had not yet definitely made a decision.

Low-Temperature Carbonization at Leeds.—There has been a breakdown in negotiations through which a new company proposes to purchase or lease the York Street gas-works from the Leeds Corporation, for the establishment of a new undertaking for production of smokeless fuel by low-temperature carbonization, and the disposal of the gas so produced. Suggestions were submitted last week to the Leeds City Gas Committee by a representative of the proposed company, but after discussion the representative abandoned his proposal in respect of the Corporation's premises. Further consideration of the offer for disposal of the gas produced by the industry was adjourned for the presentation of revised proposals.

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The prompt position remains firm, and there is good demand for most classes of coal; but the forward demand is much easier, and trading is quiet. With Continental competition again becoming normal, this is only to be expected; but outputs generally for the next three weeks or so are well booked.

Gas coals, especially the better sorts, are in good demand for all early positions, and Wear Specials quote firmly at 16s. 6d. f.o.b. Best qualities are quoted at 15s. 6d., but seconds are slightly easier. Coking coals are still a very firm market, and forward inquiry for these is stronger than for other sorts. The quotation is 15s. 6d. to 16s., and business can be had at these prices for some way ahead. Durham unscreened bunkers are not so strong, though best makes are scarce for prompt, and ask 17s. f.o.b., while ordinaries are obtainable at 15s. 6d. Best Northumberland screened steams ask 16s. to 16s. 3d. for early shipment; but this can be discounted for forward.

Gas coke is quiet, and 19s. to 19s. 6d. f.o.b. is quoted for shipment.

YORKSHIRE AND LANCASHIRE.

Although a strong inquiry continues, production is more equal to the demand. It is difficult to supply the export inquiry for best hards, and values are fairly well maintained, although in individual instances reductions have been made to secure business. Prices on prompt account are 18s. 6d. to 19s. per ton f.o.b. Industrial fuel is quieter; but there has been no material alteration in values. Forward inquiries have, however, been checked, although new contracts are indicated at slightly increased figures as compared with last year.

The following are the Humber bunker and export prices f.o.b. usual shipping ports:

South Yorkshire—Hards, Association, bunkers 20s. 9d. to 21s., export 17s. 6d. to 18s.; screened gas coal, export 17s. to 17s. 6d.; washed trebles, export 17s. 6d.; washed doubles, bunkers 19s., export 16s. to 16s. 6d.; washed singles, export 15s. 6d.; washed smalls, bunkers 15s., export 12s.; rough slack, bunkers 13s. 6d. to 13s. 9d., export 11s. to 11s. 6d.; smithy peas, export 17s. 6d. to 18s. 6d.

West Yorkshire—Hartley's (f.o.b. Goole), bunkers 17s. 6d., export 16s. to 16s. 6d.; screened gas coal, export 17s. to 17s. 6d.; washed trebles, export 17s.; washed doubles, export 15s. 6d. to 16s.; washed singles, export 15s.; washed smalls, bunkers 14s. 9d., export 11s. to 11s. 6d.; unwashed trebles, export 16s. 6d.; unwashed doubles, export 14s.; rough slack, bunkers 13s. 6d., export 9s. to 9s. 6d.; coking smalls, export 9s. to 9s. 6d.

Derbyshire and Nottinghamshire—Top hards, bunkers 20s. to 20s. 9d., export 17s. to 18s.; cobbles, export 17s. to 17s. 6d.; washed trebles, export 16s. 6d. to 17s.; washed doubles, export 15s. 6d. to 16s.; washed singles, export 14s. 6d. to 15s.; washed smalls, bunkers 14s. 9d. to 15s., export 11s. 6d.; unwashed doubles, export 14s. to 14s. 6d.; rough slack, bunkers 13s. 3d. to 13s. 9d., export 9s. 6d. to 10s. 6d.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, bunkers 18s. to 18s. 6d., export 16s. to 17s.; gas coke, export 20s. to 22s. 6d.; furnace coke, export 20s. 6d. to 21s. 6d.; washed steam (Goole, West Yorkshire), bunkers 18s.; (Hull, West Yorkshire), bunkers 18s. 6d.; (Hull, South Yorkshire), bunkers 18s. 9d. to 19s., export 16s.

MIDLANDS.

There is now no material deficiency of supply in any direction. The best descriptions of household coal have again been in brisk demand, and customers' requirements have not in all cases been fulfilled as fast as they desired, having regard to the return of cold weather; but the inconvenience has been only temporary. That intermediate qualities for domestic consumption have been plentiful is attested by a drop in prices of 1s. and frequently more.

Current output has been more than ample to meet industrial needs. Nuts and beans have been readily obtainable at 12s. to 14s. at the pit head. This, indeed, is a liberal estimate of market values as regards some of the coal on offer. Slacks have been coming forward faster than they could be absorbed. Good nutty samples have changed hands at 5s. 6d. upwards; lower prices being taken where there was strong pressure to sell. There is a sharp repression of output at the majority of the pits.

The squeeze in coke is relaxing. More is being required for the blast furnaces, particularly on the steel side; but more is available. Exports have been less active, and to the tonnage thus diverted to the home market is added a considerable part of the output which till recently was going into domestic consumption, but which has been set free for industrial use by the advance of the season.

Whereas something more than 15s. would have been paid for prompt supplies of coke by harassed blast furnacemen a few weeks ago, purchases could now be effected probably at 14s. 6d.

CONTRACTS OPEN.

Coal.

The Lancaster Corporation Gas Department invite tenders for the supply of gas coal. [See advert. on p. 164.]

The Gas and Water Departments of the Urban District Council of Hoylake and West Kirby invite tenders for coal. [See advert. on p. 164.]

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

London, *April* 15.

The buying of pitch for the current season continues, and inquiries are also being received for delivery during October/December. The price remains steady at about 35s. per ton for prompt shipment; but higher prices are said to have been asked for autumn delivery.

Creosote remains steady at about 6½d. per gallon, and sales are said to have been made at this parity.

Tar spirits prices are unchanged.

Tar Products in the Provinces.

April 15.

The average prices of gas-works products during the week were: Gas-works tar, 18s. to 23s. Pitch—East Coast, 31s. 6d. to 32s. 6d. f.o.b. West Coast—Manchester, 26s. 6d. to 27s.; Liverpool, 28s. 6d. to 29s. 6d.; Clyde, 28s. 6d. to 29s. 6d. Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3⅞d. to 1s. 4¼d. Heavy naphtha, North, 1s. to 1s. 0½d. *Creosote, in bulk, North, liquid, 3⅞d. to 4⅛d.; salty, 3½d. to 3⅝d.; Scotland, 3⅝d. to 4⅛d. Heavy oils, in bulk, North, 6d. to 6⅛d. Carbolic acid, 60 p.ct., 1s. 10d. to 1s. 10½d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

*Correction.—Owing to a typographical error the prices for creosote were inadvertently given in last week's issue as . . . 3⅝d. to 4⅛d.; the value should have been given as 3⅞d. to 4⅛d.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	1 0 to	1 1	per gallon at works
Motor ,, . . .	1 7 ,,	1 8	,, ,, ,,
90 p.ct. ,, . . .	1 9 ,,	1 10	,, ,, ,,
Pure ,, . . .	2 0 ,,	2 1	,, ,, ,,

TRADE NOTES.

Slingsby Trucks.

Messrs. H. C. Slingsby, of Kingsway, W.C. 2, have published a list of their manufactures of trucks, elevators, portable stackers, hand carts, ladders, &c. The list is fully illustrated, and particulars as to size and capacity are included.

Gas Compressors and Exhauster for Bradford.

The Bradford Corporation Gas Committee have accepted the tenders of the Bryan Donkin Company, Ltd., of Chesterfield, to supply and erect three rotary gas compressors at Birkshall Gas-Works; and of Geo. Waller & Son, Ltd., of Stroud, to supply and erect a steam-driven gas exhauster at the same works.

Steel Gas Pipes.

Messrs. Stewarts & Lloyds, Ltd., of London, Birmingham, and Glasgow, have published their April stock list of steel gas pipes. Details are given of various grades of pipe, together with particulars of specials. The pipes can be supplied coated outside only with bituminous solution and wrapped, if required, with bitumized hessian.

Hilger Spectroscopically Standardized Substances.

Messrs. Adam Hilger, Ltd., of Camden Road, N.W. 1, have recently acquired considerable quantities of rare earths of the highest research purity, which are guaranteed by the producer to exceed the high standard of 99·9 p.ct. In addition to the tests of purity carried out by their investigators, Dr. Wilhelm Prandtl, of Munich, and Prof. Luigi Rolla, of Florence, independent tests have been made by themselves, and their customers receive with each purchase, however small, a complete report on the material. The report relies on careful spectrographic analysis by means of powerful spectrographs, using both the emission and absorption spectra.

Dovetail Steel Sheeting.

Messrs. Fredk. Braby & Co., Ltd., of Glasgow, have issued a brochure dealing with one of the firm's specialities—namely, Eclipse dovetail steel sheeting. This material is manufactured from high-grade close annealed steel sheets, accurately corrugated into dovetail section. The sheets can be supplied in any length up to 10 ft., in widths up to 2 ft., and in any gauge from No. 14 to No. 30, either black, galvanized, or painted. Dovetail steel sheeting can be shaped, curved, or arched for numerous purposes, such as for use for floors, roofs, side walling, landings, partitions, staircases, &c., and can be fixed either to reinforced concrete frames or to structural steel framework. Because of its shape the sheeting gives a good bond to the concrete above, and at the same time forms a key for plastering on the underside. It is fire proof, damp proof, and vermin proof.

A gas exhibition and cookery demonstrations have been held in Beanland's Pavilion, Cleveleys, arranged by the gas department of Thornton District Council.

At Sheffield, on April 12, Henry Naylor (51), of Maltravers Crescent, Sheffield, was fined £1 for stealing 14s. 1d. from a gas meter, the property of the Sheffield Gas Company.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Apl. 12.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			%p.a	% p.a.				
171,978	Stk.	Feb. 7	5	5	Aldershot 5 p.c. max. C. .	70–75	..	..
412,992	,,		4	4	Do. 4 p.c. Pref. . .	73–76	..	75⅝
1,551,868	,,	Apl. 11	7⅜	7⅜	Alliance & Dublin Ord. .	97–100*	–2	97⅜–98
374,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb. . .	63–66	..	..
552,655	,,	Mar. 7	7	7	Barnet Ord. 7 p.c. . . .	112–115	..	..
800,000	1	Oct. 11	1/7½	1/4⅜	Bombay, Ltd.	20/–22/-	..	..
172,500	10	Mar. 7	8½	9	Bournemouth 5 p.c. . . .	12⅜–13⅜	..	..
600,050	10	,,	7	7	Do. B 7 p.c. . .	12⅜–12⅞	..	12⅝–12⅞
439,160	10	,,	6	6	Do. Pref. 6 p.c. .	10⅜–11¼	..	..
60,000	Stk.	Jan. 10	3	3	Do. 3 p.c. Deb. .	55–58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb. .	74–77	..	..
377,900	,,	Mar. 21	7½	7½	Brighton & Hove 6 p.c. Con.	113–116*	..	..
371,980	,,	,,	6⅔	6⅔	Do. 5 p.c. Con.	99–102*	..	..
1,387,500	,,	Feb. 21	5	5	Bristol 5 p.c. max. . . .	88½–89½a	..	..
865,000	,,	Apl. 11	8	7½	British Ord.	116–119*	–2	118–118½
100,000	,,	Dec. 20	7	7	Do. 7 p.c. Pref. . .	115–120	..	116
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. .	73–76	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	93–96	..	95
100,000	10	Dec. 6	8	6	Cape Town, Ltd. . . .	8–9	..	..
100,000	10	Oct. 25	4½	4½	Do. 4½ p.c. Pref. . .	6½–7½	..	..
160,000	Stk.	Dec. 20	4½	4½	Do. 4½ p.c. Deb. . .	73–78	..	..
696,860	,,	Feb. 21	6	6	Cardiff Con. Ord. . . .	97–100	..	..
287,880	,,	Jan. 10	7½	7½	Do. 7½ p.c. Red. Deb. .	100–103	..	..
187,150	,,	Feb. 21	5	6½	Chester 5 p.c. Ord. . . .	87½–92½b	..	..
79,185	1	Oct. 11	†2/-	†2/-	Colombo Ltd. Ord. . . .	36/–38/-	..	..
24,495	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref. .	21/–23/-	..	..
375,402	1	Apl. 11	1/9⅜	1/9⅜	Colonial Gas Assn. Ld. Ord.	24/–26/-*	–/6	..
187,848	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/–22/-*	–1/-	..
2,078,280	Stk.	Feb. 21	5	7	Commercial Ord. . . .	98–101	..	98–98½
475,000	,,	Dec. 20	8	8	Do 8 p.c. Deb. .	56–59	..	58½
900,000	,,	Sept. 27	11	11	Continental Union, Ltd. .	118–123	–2	120–122
900,000	,,	,,	7	7	Do. 7 p.c. Pref. .	123–128	..	124½
287,580	,,	Feb. 21	7	7	Croydon sliding scale . .	110–113	..	111½
498,100	,,	,,	5	5	Do. max. div. . . .	83–86	..	..
542,270	,,	Mar. 7	7	10	Derby Con.	112–117e	..	..
55,000	,,	Dec. 20	4	4	Do. Deb.	70–72e	..	..
409,000	,,	Mar. 7	5	5	East Hull Ord. 5 p.c. . .	73–75	..	..
1,002,180	10	Mar. 21	†4	†7	European, Ltd.	17½–19½	–1	17½–19½
18,703,480	Stk.	Feb. 21	5½	6⅔	Gas Light & Coke 4 p.c. Ord.	19/–19/6f	+·/3	19/–19/5⅔
2,680,000	,,	,,	3½	3½	Do. 3½ p.c. max. . . .	63–65	..	64–64⅔
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref. .	76–78	..	76–77
5,602,620	,,	Dec. 20	3	3	Do. 3 p.c. Con. Deb. .	58½–60½	..	59–60½
2,649,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. .	98–101	..	101½
93,500	,,	Mar. 21	7	7	Hastings & St L. 5 p.c. Conv	96–101*	..	..
288,740	,,	,,	5½	5½	Do. 5½ p.c. Conv.	77–82*	..	..
70,000	10	Oct. 11	†10	†10	Hongkong & China, Ltd. .	13–14	..	..
213,200	Stk.	Mar. 7	5½	6	Hornsey Con. 5½ p.c. . .	86–89	..	..
1,976,000	,,	Nov. 6	10	10	Imperial Continental Gas.	390–410	..	394–400
223,180	,,	Feb. 7	8½	8½	Do. 8½ p.c. Red. Deb.	69–72	..	..
235,243	,,	Mar. 7	7½	8	Lea Bridge 6 p.c. Ord. . .	117–120	..	..
3,145,907	,,	Feb. 21	6½	6½	Liverpool 5 p.c. Ord. . .	94½–95½b	..	..
600,000	,,	Mar 21	7	7	Do. 7 p.c. Red. Pref.	100–102b	..	..
185,786	,,	Feb. 21	9	8	Maidstone 5 p.c. Cap. . .	124–129	..	..
63,480	,,	Dec. 20	3	3	Do. 3 p.c. Deb. . .	54–57	..	..
15,000	5	Dec. 6	†8	†8	Malta & Mediterranean .	5¾–6¼	..	..
392,000	—	Apl. 2	—	5½	Metrop't'n (of Melbourne) 5½ p.c. Red. Deb. . . .	98–100	–2	99
941,920	Stk.	Nov. 22	†7	†5	Montevideo, Ltd. . . .	105–108	–½	107
2,031,315	,,	Feb. 21	5	5⅔	Newcastle & Gateshead Con.	17/6–18/-df	+·/4½	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref. .	72⅝–73⅜d	..	..
991,705	,,	Dec. 20	3½	3½	Do. 3½ p.c. Deb. .	68½–69½d	..	..
131,780	,,	Mar 7	7/1/0	7/1/0	North Middlesex 6 p.c. Con.	105–110	..	107½
900,000	,,	Nov. 22	7	9	Oriental, Ltd.	116–120	..	..
188,190	,,	Dec. 20	7½	8	Plym'th & Stonehouse 5 p.c.	112–116	..	..
424,416	,,	Feb. 21	7½	8½	Portsm'th Con. Stk. 4p.c. Std.	113–118	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	81–84	..	..
3,394,464	1	—	—	—	Primitiva Ord.	32/6–34/6	+2/6	30/–35/9
244,500	100	Dec. 3	4	4	Do. 4 p.c. Red. Deb. . .	91–94	..	..
695,000	Stk.	Jan. 24	4	4	Do. 4 p.c. Red. Deb. 1911	78–80	..	..
416,845	,,	Dec. 20	4	4	Do. 4 p.c. Cons. Deb. . .	78–80	..	79
150,000	10	Mar. 21	6	6	San Paulo 6 p.c. Pref. . .	8½–8⅝*	..	..
1,786,968	Stk.	Mar. 21	6½	6⅔	Sheffield Cons.	106–108e	..	..
95,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb. . . .	74–77e	..	..
90,000	10	June 14	:3	:4	South African	4–6	..	..
6,609,895	Stk.	Feb. 21	5	7½	South Met. Ord.	104½–106½	..	104½–105⅝
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	108–111	..	109⅛–110
1,895,445	,,	Jan. 10	3	3	Do. 3 p.c. Deb. . . .	58–60	..	58⅛
784,000	,,	Mar. 7	6½	6½	Do. 6½ p.c. Red. Db.	99–101	..	100–100½
91,500	,,	Mar. 7	8¼	8¼	South Shields Con. . . .	106½–107½d	..	..
1,543,795	,,	Feb. 21	6½	6½	South Suburban Ord. 5 p.c.	107–110	..	110
468,837	,,	Dec. 20	5	5	Do. 5 p.c. Deb.	98–101	..	98
647,740	,,	Mar. 7	5	5	South'mpton Ord. 5 p.c. max.	77–80	+1½	79–80
191,275	,,	Dec. 20	4	4	Do. 4 p.c. Deb.	72–75	..	..
350,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref. .	100–102	..	..
900,000	,,	Dec. 20	6½	6½	Do. 6½ p.c. Red. Deb.	100–102	..	..
1,002,275	,,	Mar. 7	—	6⅔	Tottenham District Ord. .	105–108	+3	103½–107½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	96–98	..	..
181,255	,,	Dec. 6	4	4	Do. 4 p.c. Deb.	75–78	..	..
389,094	,,	Mar. 7	6⅔	7	Uxbridge, Maidenhead, & Wycombe 5 p.c. . . .	93–98	..	94
68,880	,,	,,	5	5	Do. 5 p.c. pref. .	85–90 .	..	..
80,000	,,	Feb. 21	8½	9	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c. .	147–152	..	..
956,636	,,	,,	7½	7½	Do. B 8½ p.c. .	126–130	..	..
432,585	,,	,,	6⅔	6⅔	Do. C and New	102–107	..	106
252,000	,,	,,	6⅔	7½	Do. Wimbledon 5 p.c. .	115–120	..	118
98,000	,,	,,	7½	7½	Do. Epsom 5 p.c. . .	126–131	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref . . .	90–95	..	..
88,416	,,	Dec. 20	3	3	Do. 3 p.c. Deb. . . .	56–59	..	..
284,743	,,	,,	4	4	Do. 4 p.c. Deb. . . .	77–80	..	..
207,500	,,	,,	5	5	Do. 5 p.c. Deb. . . .	97–100	..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle. e.—Sheffield. f.—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year.

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Oriental Gas Company's Dividend.—The Directors of the Oriental Gas Company have resolved to pay, on May 31, an interim dividend at the usual rate of 3½ p.ct., less income-tax, on account of the year ending June 30 next.

Coal Carbonisation was registered as a private Company on April 11, with a capital of £100 in £1 shares. The objects of the Company are to acquire benefit of, or a licence in respect of, certain existing inventions relating to low-temperature carbonization of coal and other fuels, and to adopt an agreement with the Leeds Fireclay Company.

Imperial Chemical Industries.—Ten representatives from South Wales are to attend the conference of employees of Imperial Chemical Industries, Ltd., which is to be held in London on April 27. The conference will deal with works councils' questions, and the delegates will in all probability be addressed by Lord Melchett, the Chairman of the Company.

Institute of Fuel Meeting.—At a meeting of the Institute of Fuel held in London on April 10, Mr. Frank Hodges, Deputy Chairman of the National Fuel and Power Committee, said that the function of scientists was to make it possible for a country such as ours, with limited resources, to conserve energy and put it to practical industrial and human uses. Britain needed, he continued, to take care of her resources perhaps more than any other country.

Joint Management of Gas and Electricity at Ballymena.—Mr. Surman, the Gas Manager at Ballymena (Co. Antrim), has complied with the request of his Council to furnish a report on a scheme to light the town by electricity. His report recommends, among other things, a bulk supply and the joint management of the gas-works and the electricity department. Mr. Surman, whose report has been adopted, has been directed to take whatever steps he thinks necessary to meet the requirements of the Electricity Commissioners.

Bombay Gas Company Annual Report.—The following is the statement of accounts of the Bombay Gas Company to be presented to the shareholders at the ordinary general meeting to be held at the registered office of the Company, Moorgate Station Chambers, E.C., on Wednesday, April 24. The revenue account shows a profit for the year of £20,888, which sum added to the profit on exchange £5052, and the balance of £39,620 brought forward from the previous year, amounts to £65,561. After providing for the payment of interest and the interim dividend paid in November last, and writing off £5654 for depreciation of meters, there remains a balance of £47,888, out of which the Directors recommend the payment of a dividend at the rate of 3½ p.ct. (*less* income-tax), making 7 p.ct. for the year, which will leave £37,388 to be carried forward to the current year.

Chesterfield's Gas Prices.—During the consideration of the estimates of the Chesterfield Corporation, Councillor Watson, the Chairman of the Finance Committee, mentioned that the Street Lighting Committee asked for £1236 more than last year owing to the Gas Committee requiring them to pay more for gas in the coming year.

New Carbonizing Plant for Aberdeen.—The Gas Committee of the Aberdeen Town Council decided on April 11 to recommend the acceptance of the tender of Messrs. Woodall-Duckham Company, Ltd., for carbonizing plant at a cost of £88,837. The new plant will be capable of dealing with 308 tons of coal a day, producing 4,466,000 c.ft. of gas.

Gas Explosion in Canning Town.—Leakage from a gas main in a small street in Canning Town, West Ham, caused an explosion on the night of April 12, resulting in injuries to thirteen people. No one was killed, but four persons detained in the Poplar Hospital are stated to be in a serious condition. Considerable damage was done to houses and shops in the vicinity. The explosion occurred at a section of the roadway where two or three workmen had been at work during the day on repairs to a gas main. The neighbourhood is a poor one, and at the time of the explosion many people were standing on the street.

Gas and Carbonization Lectures in Hull.—A series of interesting lectures have been given in Hull by Mr. Harold E. Copp, M.Inst.C.E., Engineer and Manager of the Hull Station of the British Gas Light Company. The lecture to the Hull Association of Engineers was entitled "The Carbonization of Coal," and that to the Hull Chemical and Engineering Society, "The Gas Industry." Mr. Copp reviewed the various methods by which the treatment of coal and its derivatives might, in the near future, be developed, and referred to the use of oxygen for complete gasification; the various systems of low-temperature carbonization; and also to the hydrogenation of coal and its products by the Bergius process. The lectures were illustrated by a number of interesting slides showing the apparatus employed, and the progress of the gas industry. The members of these Societies displayed very great interest in the subject matter of the lectures as proved by the discussions and questions which were subsequently put to the lecturer.

The Ludlow Town Council have accepted the offer of the Ludlow Gas Company to lay a main and put in free of charge fittings to 40 new houses now being erected by the Council.

The Chapel-en-le-Frith (Derbyshire) Board of Guardians have accepted the tender of the Chapel and Whaley Bridge Gas Company for the supply of coke to the workhouse for the ensuing six months.

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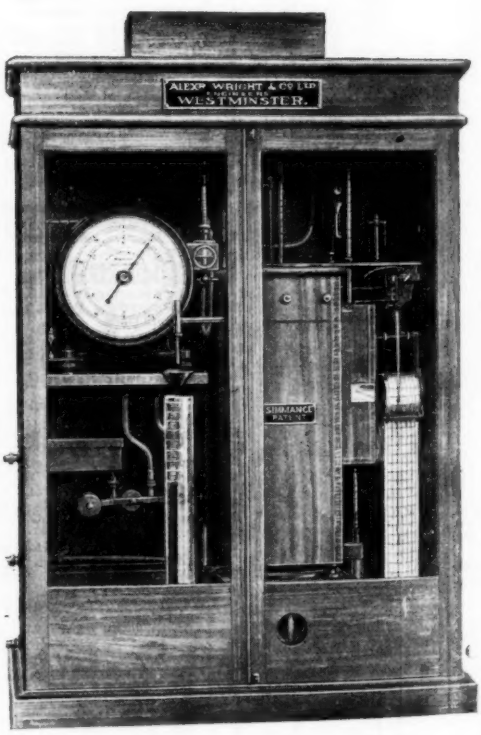

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CONTENTS.

EDITORIAL NOTES.

Institution of Gas Engineers 189
Second Reading of the Gas Bill 189
Initial Care of Retort Settings 189
Going Hand in Hand 190
Suicide and Accident Statistics 190
Blazing the Trail 190
Becker Coke Ovens at Bedwas—The Distribution Side — Low-Temperature Carbonization Patents—General Strike Affects Trades Union Membership—Nitrogen Fixation in Russia—"Gas Salesman" Supplement . 191

Forthcoming Engagements 191
Personal 192
Obituary—
Alexander Wilson 192
Walter Bourne Brady 193
On the Electrical Side 193
Devon and Cornwall Gas Officials at Plymouth —Visit to the Cattedown Tar Distillery Works 194
Gas Stock and Share Market 194
Inauguration of New Gas-Works at Johannesburg—Glover-West Installation 195
Spherical Gasholders. By S. M. Milbourne, A.M.I.Struct.E. 196
British Commercial Gas Association—Scottish and Midland District Conferences . . . 200
Steam Storage on Gas-Works—Ruths Accumulator System 200

London and Southern District Junior Gas Association—
Visit to the Lea Bridge Works 201
Heat Control of Continuous Vertical Retorts. By F. J. Bengough 203
Scottish Junior Gas Association (Eastern District)—
Visit to Galashiels Gas-Works 206
Recording Gas Calorimetry. By W. Masterton, B.Sc.Tech. 207
Notes on Coal. By F. B. Waller . . . 207
Scottish Junior Gas Association (Western District)—
Annual Report 208
Address by C. S. Shapley 208
Waste Heat Recovery. By Major W. Gregson, B.Sc. (Eng.), Assoc.M.Inst.C.E. . . 209
Yorkshire Junior Gas Association—
Visit to Sheffield 210

REGISTER OF PATENTS.

Wet Meters—Cie. pour la Fabrication des Compteurs et Matériel d'Usines à Gaz and Millet, L. 211
Gasholders—Broadhead, R. W. 211
Taps—South Metropolitan Gas Company and Harland, S. C. 211
Retort-House Governors—Glover, W. T., and Meters, Ltd. 211
Tar Distillation—Wilton, T. O., and The Chemical Engineering & Wilton's Patent Furnace Company, Ltd. 211
Multiple Incandescent Burners—Gould, F. J. 211
Sprung Holder for Mantles—Tribe, W. E. . 211
Applications for Patents 211

PARLIAMENTARY INTELLIGENCE.

House of Lords—
Private Bills and Special Orders . . . 212
House of Commons—
Smokeless Fuel in Government Offices . 212
Gas Undertakings Bill 212
Private Bills and Orders 212
Gas Undertakings Bill—Second Reading in the House of Commons 212

MISCELLANEOUS NEWS.

Coal Output Restrictions—Effect of the Five Counties Scheme 213
Inquiry at Maryport—Proposed Extensions at the Gas-Works 213
Edinburgh Gas Department Welfare Club—Visit to the Gothic Works of Messrs. R. & A. Main, Ltd. 213
Trade Notes 214
Current Sales of Gas Products 214
Coal Trade Reports—
North-East Coast 214
Yorkshire and Lancashire 214
Midlands 214
Contracts Open 214
Stock and Share List 215

PARAGRAPHS.

Safety in Mines Research Board—Selection of Coal for Gas Producers—National Physical Laboratory's Annual Report—Heat Treatment of Metals 200
Congdon Standpipe Patent Renewed—Guildford Stock Issue—Gas Exhibition at Thornton 212
New Gasholder for Keighley—Will—New Showrooms at Eastthorpe 213
Street Lighting at Easebourne 214

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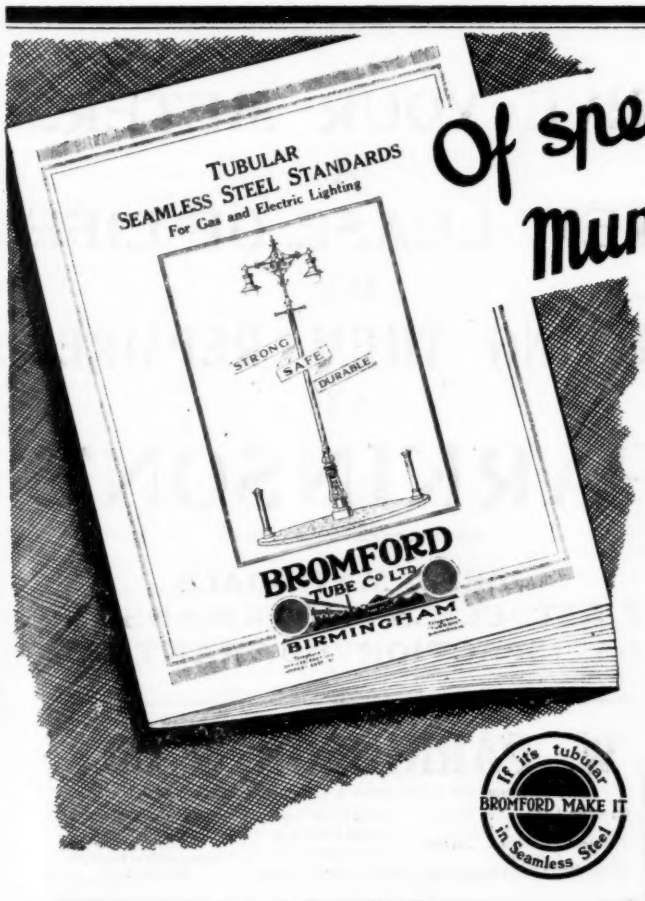

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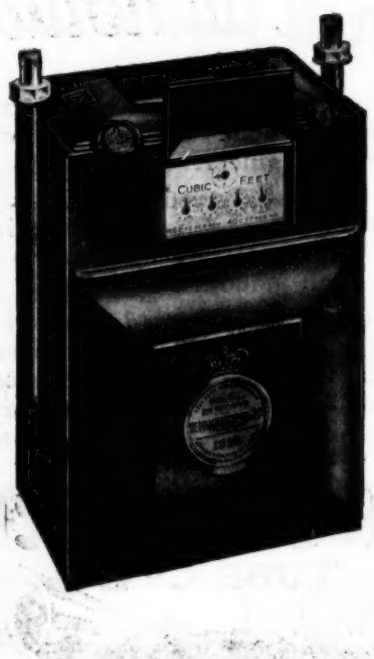

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